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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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OPERATOR AND ORGANIZATION MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOL LISTS

RECEIVING SET, RADIO AN/FRR-79

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HEADQUARTERS, DEPARTMENT OF THE ARMY
DECEMBER 1968

WARNING

Be careful when working on the 115- or 230-volt ac connections. Serious injury or DEATH may result from contact with these terminals.

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *25 October 1972*

Operator and Organizational Maintenance Manual Including Repair Parts and Special Tools Lists

RECEIVING SET, RADIO AN/FRR-79

TM 11-5820-601-12, 27 December 1968, is changed as follows:

1. Remove and insert pages as indicated in the page list below.

Remove pages	*Insert pages*
i, ii	i, ii
1-1 through 1-4	1-1 through 1-4
1-9, 1-10	1-9, 1-10
1-13 through 1-18	1-13 through 1-18
2-1 through 2-12	2-1 through 2-12.1
2-19, 2-20	2-19, 2-20
3-1, 3-2	3-1, 3-2
3-5 through 3-10	3-5 through 3-10
3-13 through 3-20	3-13 through 3-20
4-5, 4-6	4-5
5-1 through 5-6	5-1 through 5-6
6-1 through 6-4	6-1 through 6-4
None	D-1 through D-31

2. File this change sheet in the front of the manual for reference purposes.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army,
Chief of Staff.

Official:

VERNE L. BOWERS,
Major General, United States Army,
The Adjutant General.

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USASESS (10)
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Fort Huachuca (5)
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SAAD (30)
TOAD (14)
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Sig Sec USA Dep (5)
Sig Dep (5)
Sig FLDMS (1)
1st Cav Div (2)
1st Sig Bde, Vietnam (3)
Ft Leavenworth, Mid-West
Telecomm Cen (3)
Ft Detrick, East Coast
Telecomm Cen (3)
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11-158
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NG: None.

USAR: None.

For explanation of abbreviations used, see AR 310-50.

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TECHNICAL MANUAL
No. 11-5820-601-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *27 December 1968*

Operator and Organizational Maintenance Manual
Including Repair Parts and Special Tool Lists

RECEIVING SET, RADIO AN/FRR-79

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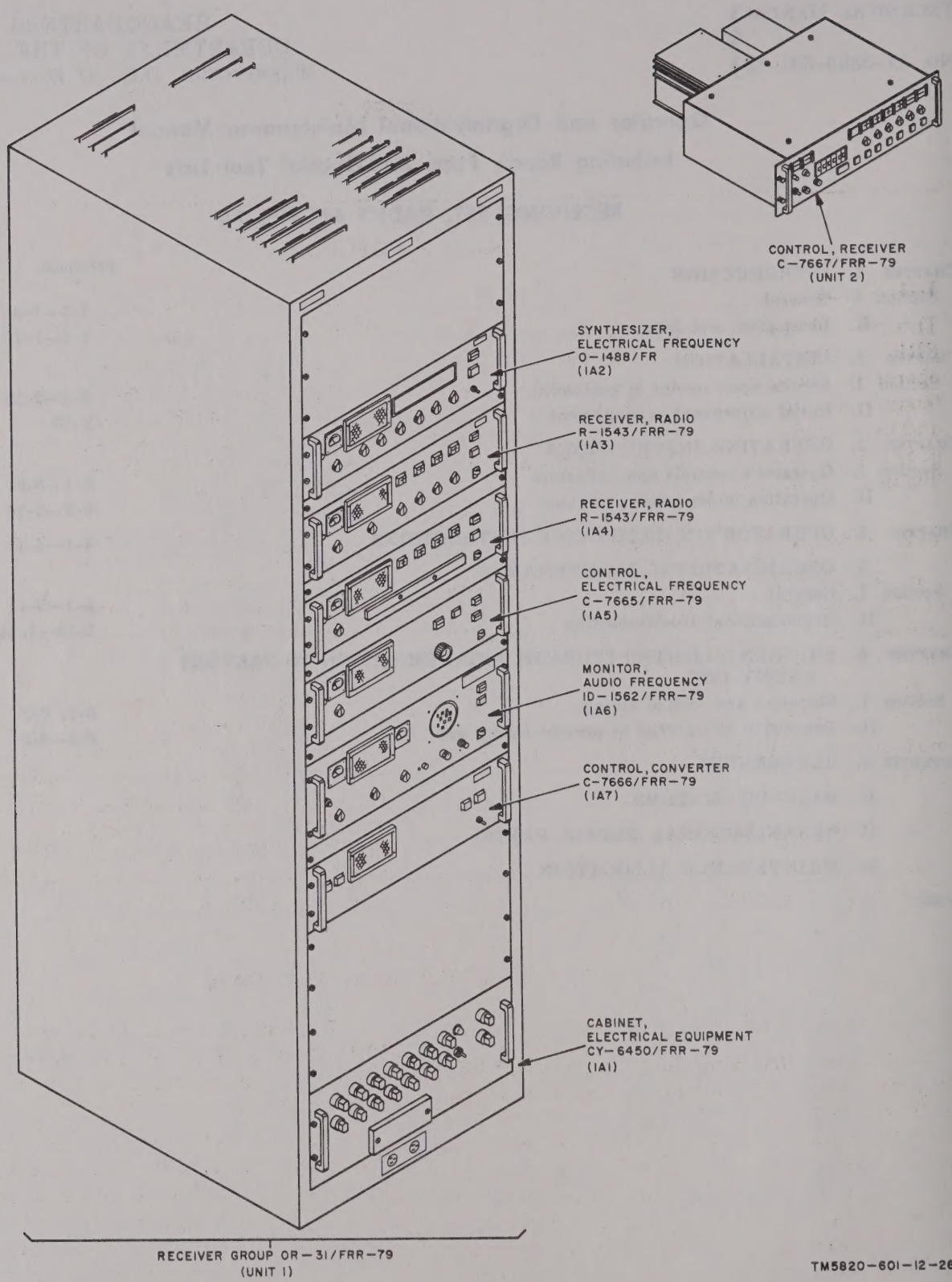

Figure 1-1. Receiving Set, Radio AN/FRR-79.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual describes Receiving Set, Radio AN/FRR-79 (fig. 1-1), and covers its installation, operation, and operator and organizational maintenance for the equipment. It includes cleaning and inspection of the equipment and replacement of running spares available to operator and organizational maintenance personnel.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to the latest issue of DA Pam 310-7 to determine if there are modification work orders (MWO's) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions given in TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army)/NAVSUP Pub 378 (Navy)/AFR 71-4 (Air Force)/and MCO P4030.29 (Marine Corps).

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38 (Army)/NAVSUP Pub 459 (Navy)/AFM 75-34 (Air Force)/and MCO P4610.19 (Marine Corps).

d. Reporting of Equipment Publication Improvements. The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MA-CT, Fort Monmouth, NJ 07703.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. Purpose. Receiving Set, Radio AN/FRR-79 (receiving set) is a self-contained, high frequency, remote or local controlled, independent sideband receiving system. It is intended for general purpose, fixed ground station operation. The receiving set is used in conjunction with other communications equipment (telephone, teletypewriter, facsimile, and data) normally provided at a communications or signal center, and receives transmissions in the frequency range from 2 to 29.9999 Megahertz (MHz) containing up to four separate intelligence channels, or up to 64 separate data channels. Space diversity operation, utilizing two antennas, is used.

b. Use (fig. 1-2). Receiving Set, Radio AN/FRR-79 is used as the link between a distant compatible transmitter and station communications equipment.

(1) *Transmitting station.* Four independent 3-kilohertz (KHz) wide audio channels containing voice or data signals are converted to a frequency-multiplexed, amplitude-modulated RF signal in the frequency range from 2 to 29.9999 MHz. The modulated radiofrequency (RF) signal is amplified and applied to a transmitting antenna. The antenna radiates the RF signal to the receiving station.

(2) *Receiving station.* A typical receiving station which uses Receiving Set, Radio AN/

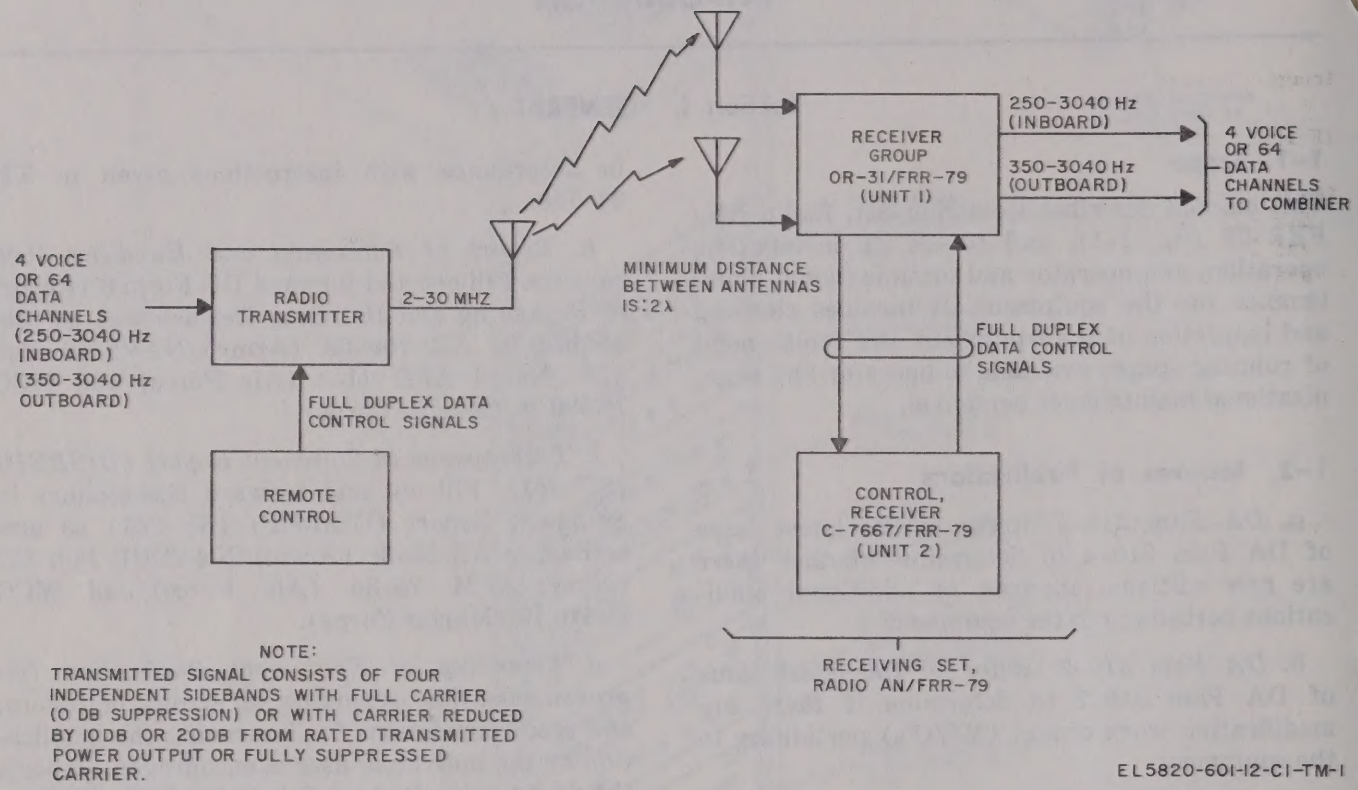

Figure 1-2. Receiving Set, Radio AN/FRR-79, system tie-in.

FRR-79 consists of Receiver Group OR-31/FRR-79, unit 1, being fed by two separate high frequency (HF) broadband rhombic antennas spaced a minimum of two wavelengths apart. Control, Receiver C-7667/FRR-79, unit 2, located at a remote site, is connected to the OR-31/FRR-79 through a full duplex control data circuit. The received RF signals are fed to the OR-31/FRR-79 from the station antennas, and simultaneously applied to Receiver, Radio R-1543/FRR-79 (main and diversity receivers) in Cabinet, Electrical Equipment CY-6450/FRR-79. Synthesizer, Electrical Frequency O-1488/FR, a highly stable synthesizer, is used to tune the main and diversity receivers and provide them with carrier reinsertion demodulation frequencies. Control, Electrical Frequency C-7665/FRR-79 compensates for a drifting signal, provided the transmitted carrier is not suppressed more than 20 decibels (db) from the sideband signal. The OR-31/FRR-79 is equipped with Monitor, Audio Frequency ID-1562/FRR-79 which provides audible and metered outputs from any of the four channel pairs (four channels each from the main and diversity receivers). The audio outputs of the OR-31/FRR-79 are routed to an external combiner through station interconnecting cables. The OR-31/FRR-79 can be remotely operated by Control, Receiver C-7667/FRR-79. From a remote position, the operator can perform many of the functions normally available to the operator of the CY-6450/FRR-79.

1-5. Technical Characteristics

a. Receiving Set, Radio AN/FRR-79.

Frequency range	2 to 29.9999 MHz.
Frequency selection	By selection of synthesizer frequency only.
Tuning	10 seconds maximum (auto mode).
RF input impedance	50 ohms.
Input vswr	2.5 to 1 maximum.

Audio output tolerance and range	± 0.5 db over range of 250 to 3,040 Hz for channels A1 and B1, and 350 to 3,040 Hz for channels A2 and B2 variable from − 30 to + 10 dbm.
Spurious response tolerance	10 db (minimum) below output reference level at 0.5-microvolt sensitivity (10 db S + N/N).
Image rejection	100 db (minimum) referred to 1 microvolt.
IF rejection	100 db (minimum) referred to 1 microvolt.
Overall intermodulation distortion (2nd and 3rd harmonics, and higher)	55 db (minimum) below reference audio output (1,000 Hz at 0 dbm) with two equal amplitude RF signals at the input. R-1543/FRR-79 meets requirement with any input from 2 to 200,000 microvolts when tuned from 2 to 29.9999 MHz.
Output noise quieting	At maximum R-1543/FRR-79 sensitivity, and with signal plus noise-to-noise ratio at output of 10 db, output signal-to-noise ratio increases linearily with linear increase of input signal until signal plus noise-to-noise ratio is at least 60 db. Linearity is 90%.
Channel agc time constants:	
Vfct	20-millisecond attack time; 100-millisecond release time.
Analog voice	40-millisecond attack time; 2-second release time.
High-speed data	200-millisecond attack and release time.
Agc range	Output does not vary more than ± 1.0 db, while input varies 120 db (minimum) down from 2-volt input.
Sensitivity	0.5 microvolt for 10-db signal + noise-to-noise ratio.
Audio output impedance	600 ohms balanced with return loss of 26 db from 370 to 3,040 Hz.
Audio output level	0 dbm (nominal).
Audio output range	Controllable from + 10 to − 30 dbm.
Audio output balance	Each audio output is balanced with respect to ground so that longitudinal currents are suppressed at least 40 db at any output level from + 10 to − 30 dbm.
Number of audio channels	4 each for main and diversity receivers.
Audio output response characteristics:	
Overall R-1543/FRR-79 passband	12 KHz (approx).
Channel bandpass	2,790 ± 10 Hz for A1 and B1 channels. 2,690 ± 10 Hz for A2 and B2 channels.
Primary power requirements	115 or 230 volts ± 10 percent, 47.5 to 440 Hz at 600 volt-amperes (maximum).
IF frequency stability:	
Short term	± 1 part in 10^8 from 1 microsecond to 24 hours on all frequencies.
Long term	± 5 parts in 10^8 for 7 days on all frequencies.
External frequency	1 MHz at 1 volt rms.
Harmonic and spurious output	10 db (min) below maximum sensitivity.
Afc excursion range	± 2 kHz.
Afc tracking rate	100 Hz/sec^2.
Afc translation error	Less than ± 2 Hz.
Afc capture range	± 55 Hz.

b. Full Duplex Control Data Circuit.

Control data transmission rate	75-baud, nine-unit, seven-level, start-stop telegraph signals.
Type	60 or 20 ma (strap-selected) neutral telegraph loop.
External loop supply battery	130 volts dc, nominal (150 volts dc maximum).
Loop keying output impedance	260 ohms ± 10% in mark condition; 100K ohms minimum in space condition.
Input impedance	200 ohms maximum.
Command control lines	Multiple parallel-output lines provide R-1543/FRR-79 control signals derived from commands stored in R-1543/FRR-79 control memory. Control line states are normally changed only by control commands from C-7667/FRR-79.
R-1543/FRR-79 status lines	Multiple parallel-input lines provide R-1543/FRR-79 status data to R-1543/FRR-79 control.

1–6. Components and Dimensions

The components and dimensions of Receiving Set, Radio AN/FRR–79 (figs. 1–3 through 1–8) are listed in the chart below.

Quantity	Item	Dimensions (in.) Height	Depth	Width	Weight (lb)
1	Receiver Group OR–31/FRR–79	84	28	22⅜	600
1	Cabinet, Electrical Equipment CY–6450/FRR–79	84	28	22⅜	325
1	Synthesizer, Electrical Frequency 0–1488/FR	5¼	21½	19	0
2	Receiver, Radio R–1543/FRR–79	5¼	20½	19	50
1	Control, Electrical Frequency C–7665/FRR–79	5¼	20½	19	30
1	Monitor, Audio Frequency ID–1562/FRR–79	7	20½	19	0
	Control Converter C–7666/FRR–79	5¼	20½	19	30
	Control, Receiver C–7667/FRR–79	5¼	20½	19	26

1–7. Common Names
(fig. 1–1)

A list of the common names assigned to the components of Receiving Set, Radio AN/FRR–79 is given in the chart below.

Reference designation	Nomenclature	Common name
1	Receiver Group OR–31/FRR–79	Receiver group.
1A1	Cabinet, Electrical Equipment CY–6450/FRR–79.	Electrical equipment cabinet.
1A2	Synthesizer, Electrical Frequency 0–1488/FR	Synthesizer.
1A3, 1A4	Receiver, Radio R–1543/FRR–79	Main receiver or diversity receiver.
1A5	Control, Electrical Frequency C–7665/FRR–79	Automatic frequency control.
1A6	Monitor, Audio Frequency ID–1562/FRR–79	Audio monitor.
1A7	Control, Converter C–7666/FRR–79	Control converter.
2	Control, Receiver C–7667/FRR–79	Remote control.

1–8. Description of Receiving Set, Radio AN/FRR–79
(fig. 1–10)

a. Receiving Set, Radio AN/FRR–79 comprises two units: Receiver Group OR–31/FRR–79 (receiver group, unit 1) and Control, Receiver C–7667/FRR–79 (remote control, unit 2). The receiver group consists of six major components and three minor components which are housed in Cabinet, Electrical Equipment CY–6450/FRR–79. The remote control consists of a single chassis assembly with a front control panel and protective cover (fig. 1–8). When used, the remote control is connected to the receiver group through a full duplex control data circuit, and provides the remote operator with capability to control and monitor operation of the receiver group.

b. The functional relationship of the units and components of the receiving set are shown in figure 1–10. The RF signals from the main and diversity antennas are connected to the receiver group at the data distribution panel at the rear of the electrical equipment cabinet (fig. 1–12). The received signals are fed through antenna protectors and routed to the

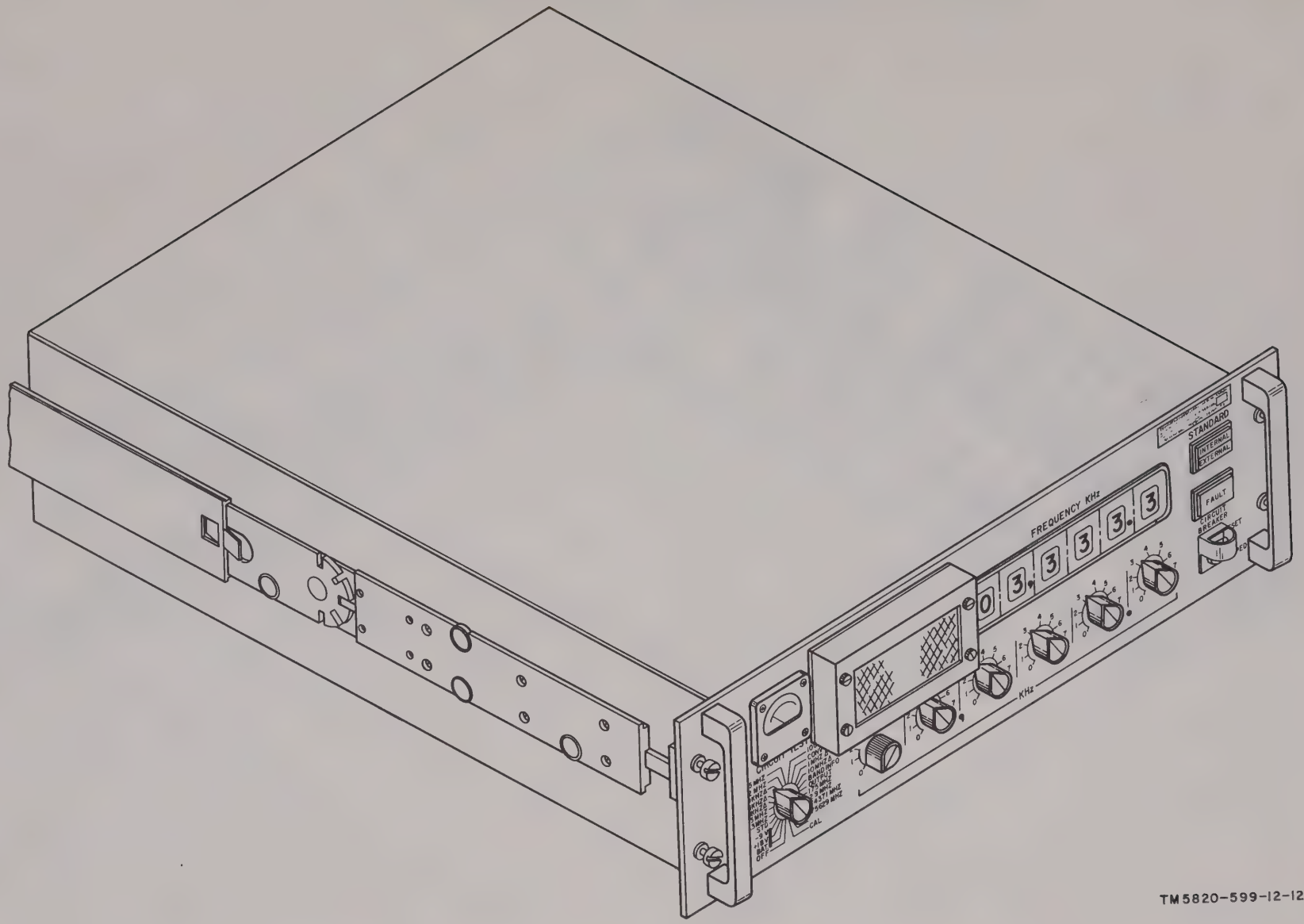

Figure 1–3. Synthesizer, Electrical Frequency 0–1488/FR.

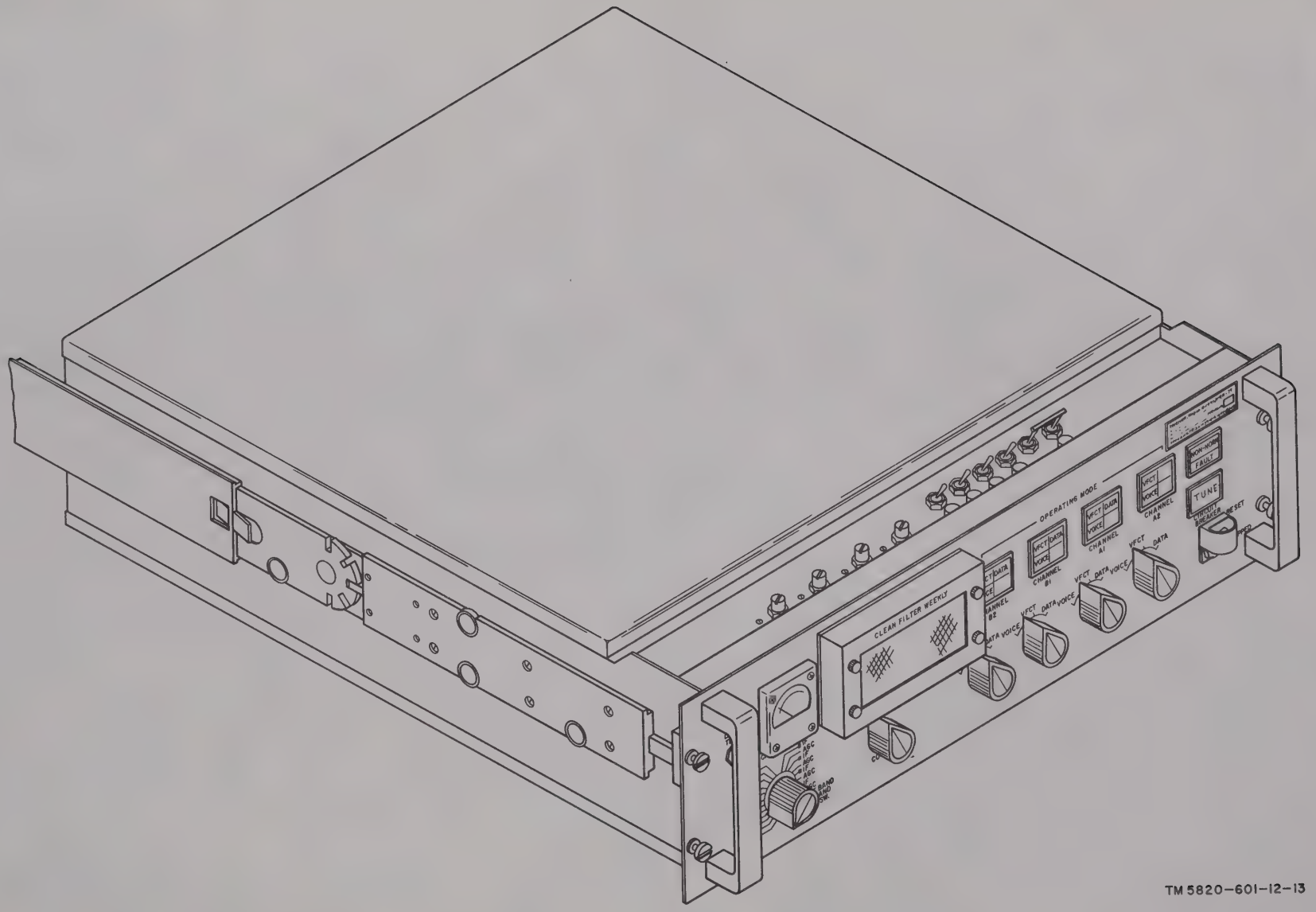

Figure 1–4. Receiver, Radio R–1543/FRR–79.

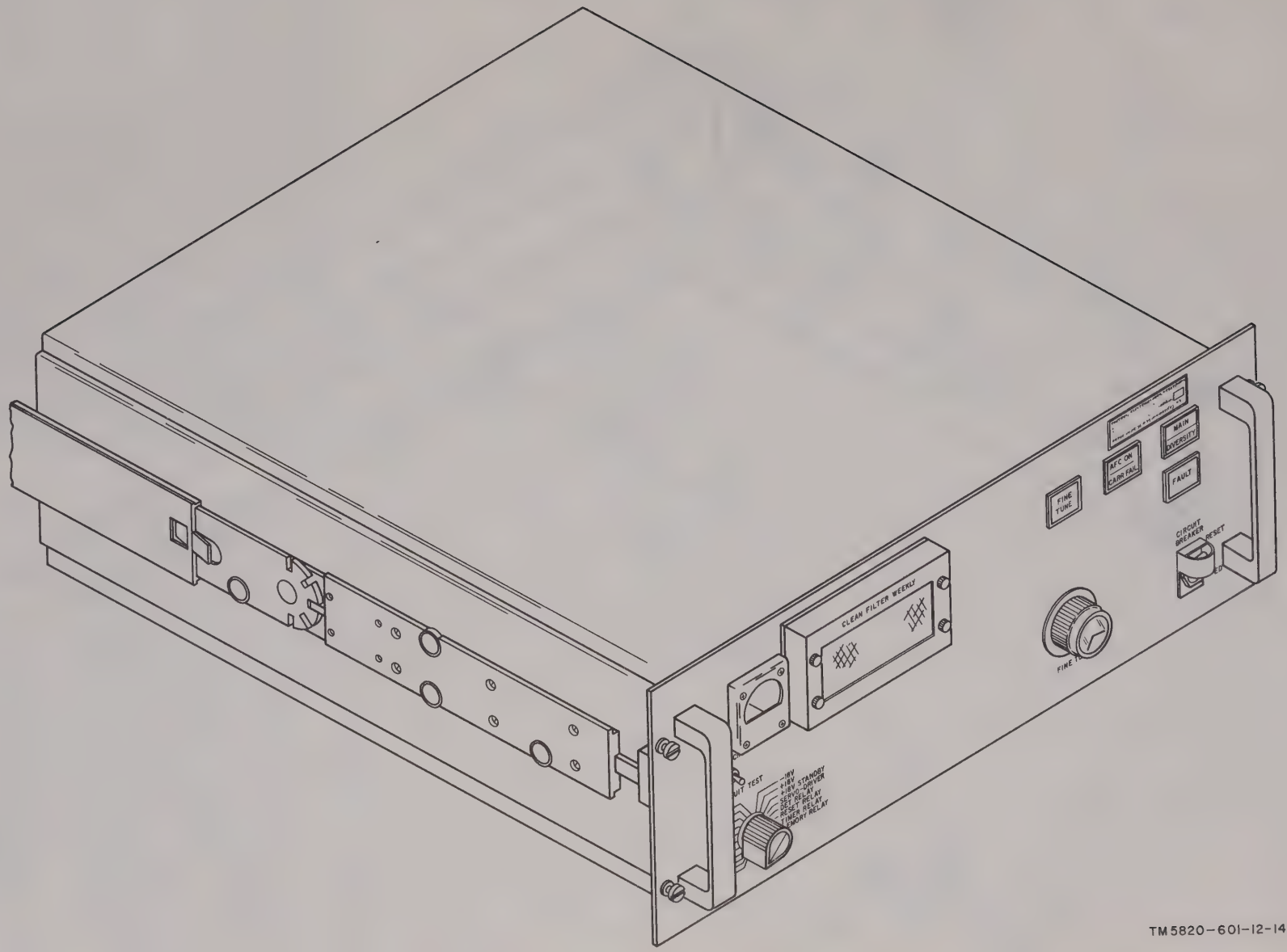

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Figure 1–5. Control, Electrical Frequency C–7665/FRR–79.

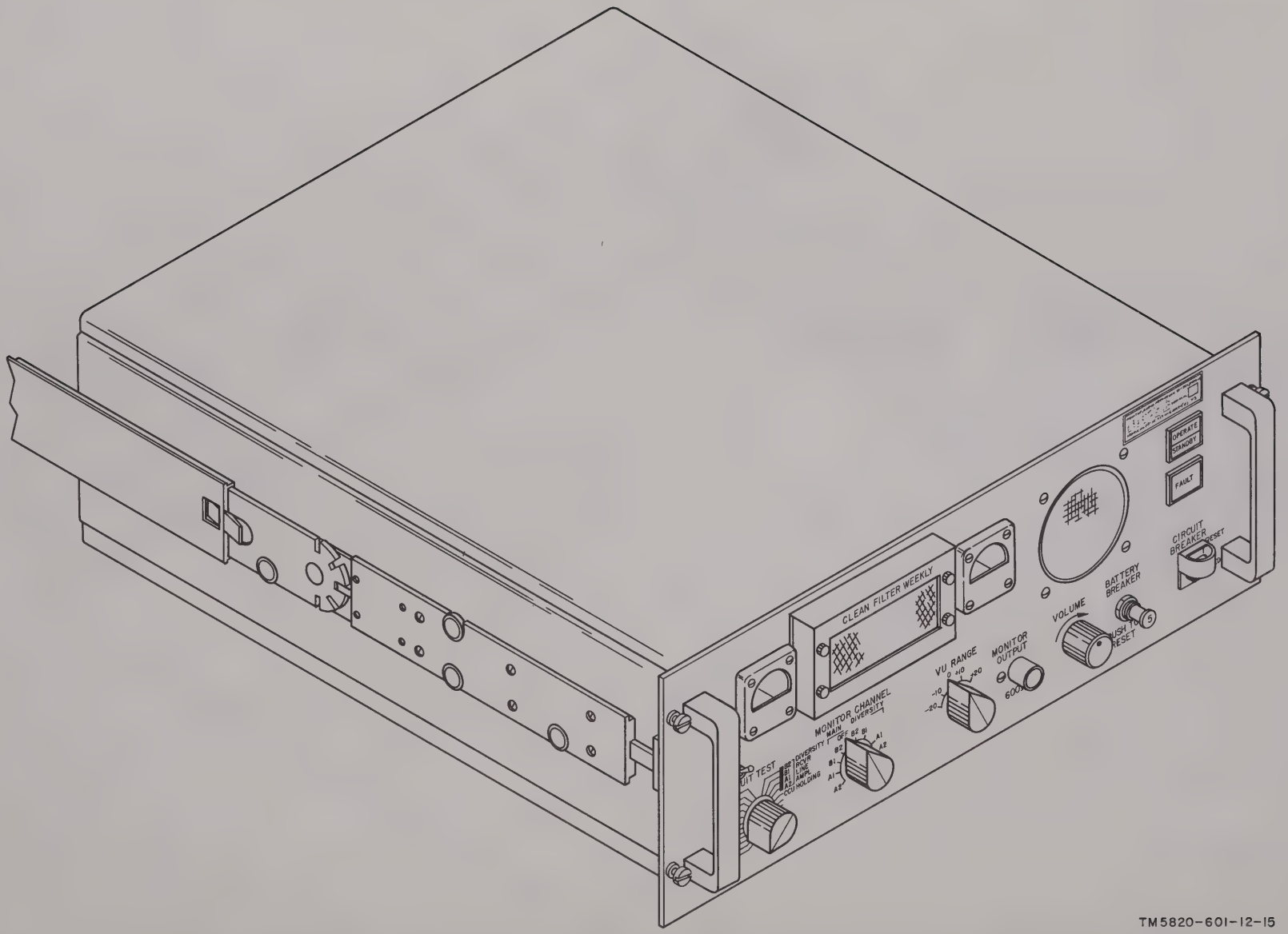


Figure 1–6. Monitor, Audio Frequency ID–1562/FRR–79.

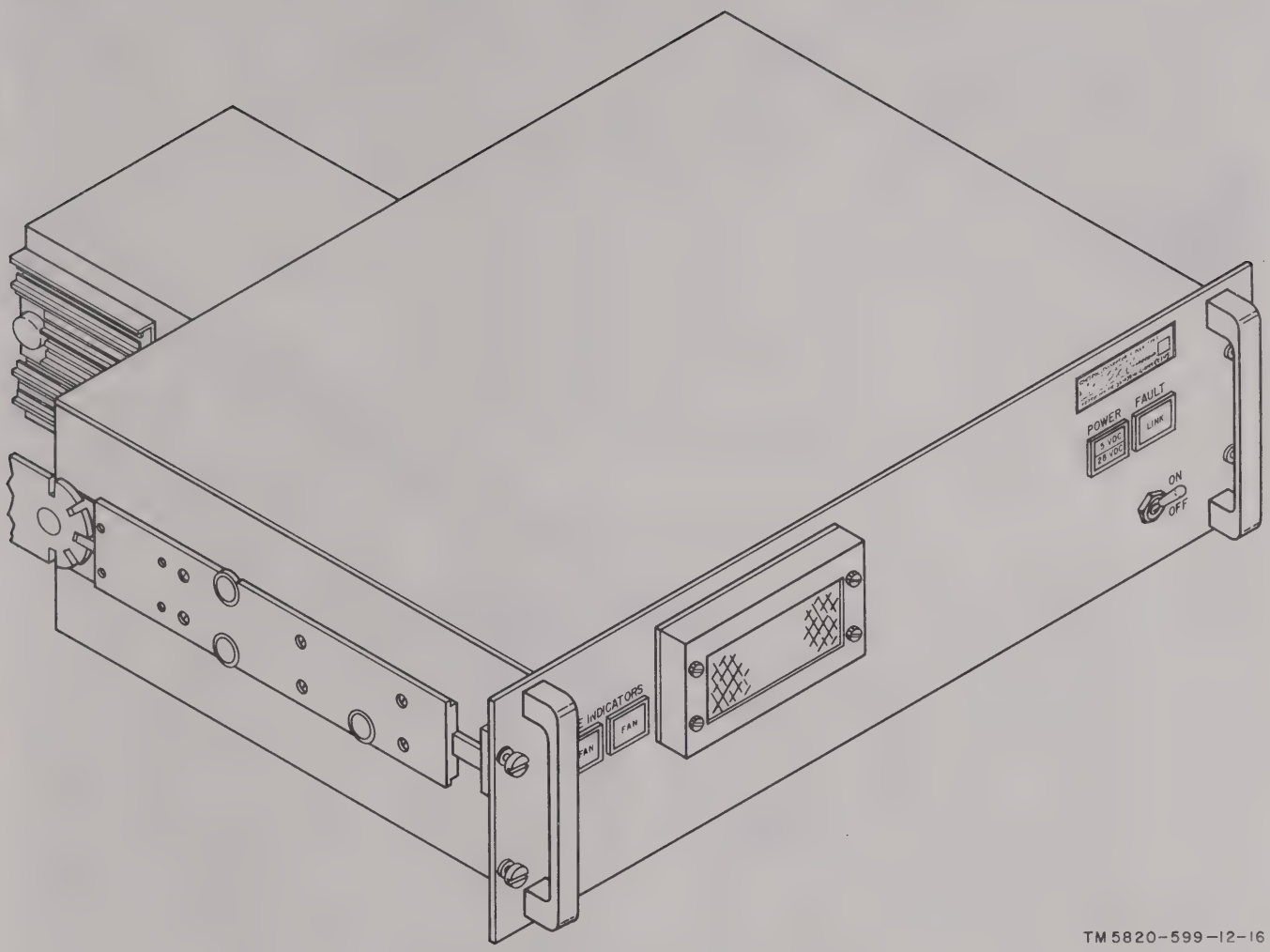


Figure 1–7. Control Converter C–7666/FRR–79.

main receiver and diversity receiver. In each receiver, the RF signal is demodulated, separated into four independent audio channels, and amplified and fed to the audio monitor. The audio monitor provides amplification for all channels (four each from the main and diversity receivers) and facilities to permit the audible and visual monitoring of individual channels. The audio monitor also provides for manual operate-standby power control of the equipment, and supplies standby or emergency power to the major components of the receiver group. The four main and four diversity audio channel signals are routed from the audio monitor to terminal boards on the data distribution panel (fig. 1–12). The data distribution panel is the interface between the receiver group and the station facilities control.

1–9. Description of Receiver Group OR–31/FRR–79

a. Electrical Equipment Cabinet (fig. 1–11). The steel electrical equipment cabinet weighs approximately 200 pounds without components, and is equipped with mounting rails to accept standard 19-inch panel assemblies. A removable door is flush with the rear of the electrical equipment cabinet and is secured by a latch. The top of the electrical equipment cabinet is louvered and serves as an air exhaust.

WARNING

The electrical equipment cabinet must be secured to the building floor by mounting bolts. Failure to do so may cause the electrical equipment cabinet

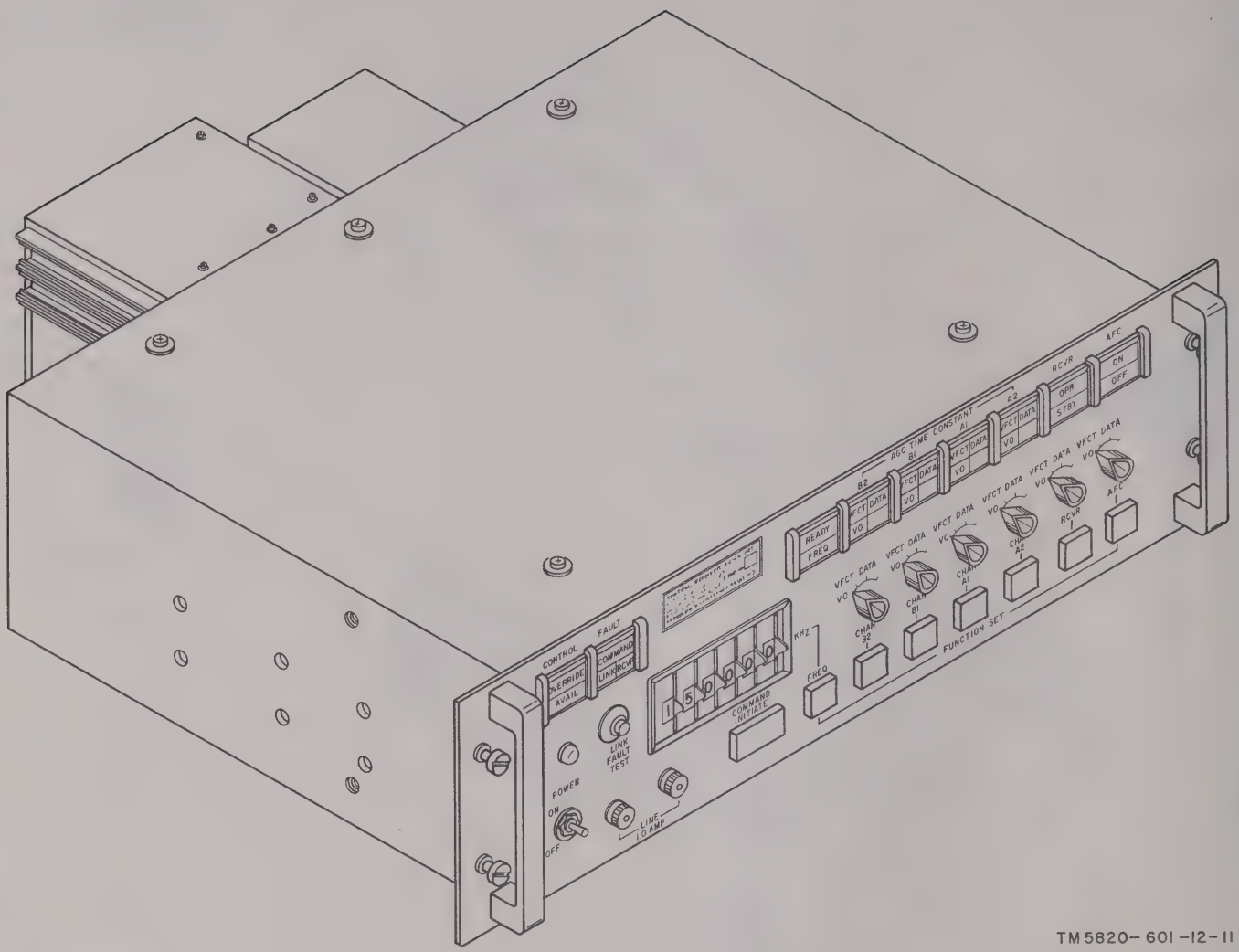
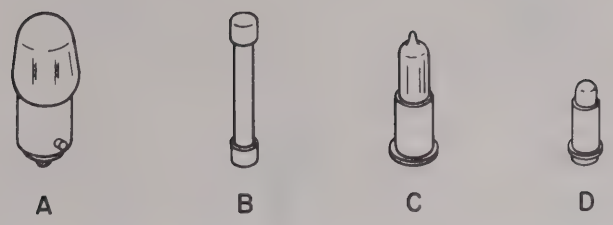


Figure 1-8. Control, Receiver C-7667/FRR-79.

to overturn if all components are extended on their slides at the same time.

Four holes, at each corner of the baseplate, are used to accommodate mounting hardware. A 6- by 12-inch cutout is provided in the electrical equipment cabinet baseplate to permit entry of interconnecting cables. Cables can also enter the electrical equipment cabinet through holes at the top or rear (below the access door), depending on installation requirements; the preferred method is to run cables through the bottom plate. All major components of the receiver group, including the synthesizer, main and diversity receivers, automatic frequency control, audio monitor, and control converter, are mounted on ball bearing-type tiltable slides. Each component can be withdrawn from the front of the electrical equipment cabinet by loosening the four captive fasteners on the front panel and pulling forward. The component may be completely removed by disconnecting all cables and the retractor link, and by depressing the V-latch located on each side of the securing slides (fig. 1-11). A cable retractor at each mounting position supports the cables during withdrawal of the component from the electrical equipment cabinet. The 1 7/8-inch filler panels, located between component front panels, should be removed before remov-



LEGEND:

A. LAMP, GLOW, 5240-682-3411.
B. FUSE, CARTRIDGE, 5920-296-1517.
C. LAMP, GLOW, 8EC4.
D. LAMP, INCANDESCENT, 6240-155-7857, 6240-155-7836, 6240-940-7070.

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Figure 1-9. Running spares.

ing any component. Each component, except the audio monitor, may be tilted upward 45° and 90° and downward 45° and 90°. The audio monitor contains the battery pack which may lose electrolyte if the component is tilted in either direction while the battery is venting. The power distribution panel, located at the bottom of the electrical equipment cabinet, is not slide-mounted and is not normally removed during maintenance of the equipment. The interior of the power distribution panel can be reached by removing a cover plate located below the electrical equipment cabinet rear door. The panels above the synthesizer and the power distribution panel are blank. Two other components, the data distribution panel and the RF distribution panel, are permanent fixtures attached to the vertical mounting rails at the rear of the electrical equipment cabinet (fig. 1–12).

b. Synthesizer (fig. 1–3 and 1–10). The synthesizer generates variable injection frequencies needed to tune the main and diversity receivers. Six selector switches are used to select any receiver frequency within the range from 2 to 29.9999 MHz in 100-Hertz (Hz) steps and supplies fixed carrier reinsertion frequencies used by the main and diversity receivers to produce four independent audio channels. The synthesizer also supplies highly accurate, fixed-reference frequencies utilized by Control, Electrical Frequency C–7665/FRR–79. The synthesizer permits either local or remote frequency selection. Local frequency selection is accomplished directly from the synthesizer front panel. Remote frequency selection is accomplished by commands initiated at the remote control (fig. 1–10) and fed to the control converter. The control converter command determines the variable output frequency of the synthesizer. A visual readout of the selected frequency is provided immediately above the switches. A 24-position circuit test switch on the synthesizer front panel is used to monitor synthesizer performance and evaluate various circuit parameters as indicated on a circuit test meter. The synthesizer has provisions for using an external frequency standard in place of the internal unit. A front panel indicator switch provides a visual indication of the standard in use, and enables the operator to select the internal or external standard. All local operator controls are located on the front panel. Input and output connections are made at the rear panel. Access to the top and bottom of the chassis is obtained through removable top and bottom covers. The synthesizer subassemblies are of modular or printed circuit board construction utilizing solid-state design. The subassemblies

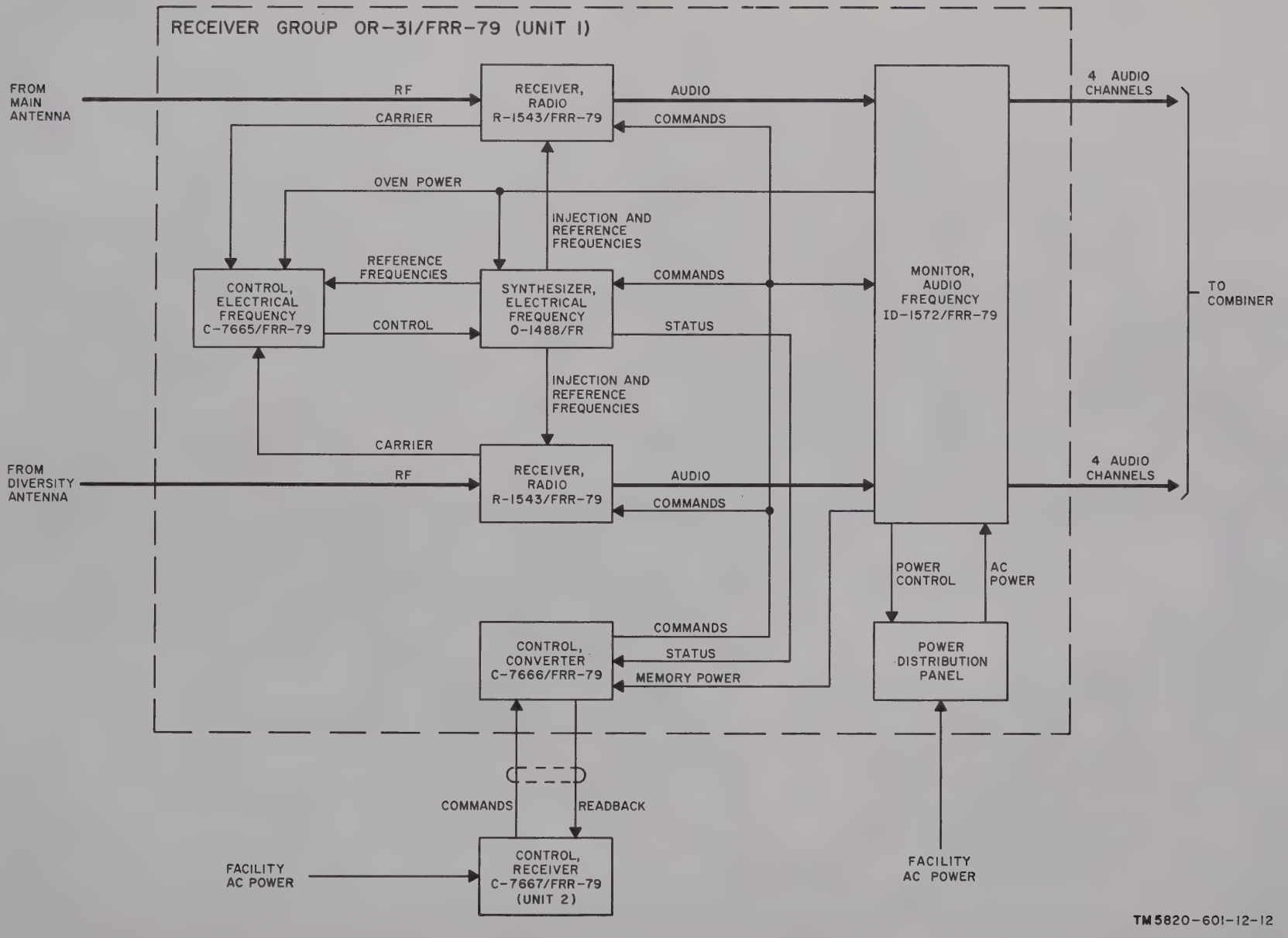

Figure 1–10. Receiving Set, Radio AN/FRR–79, block diagram.

are either plug-in or bolt-on types with coaxial connectors. The synthesizer has a forced air cooling system which consists of a blower motor and a filter. The filter is removable and is located on the front panel. A wire-mesh, polyurethane-type filter is used, which requires only periodic maintenance.

c. Main and Diversity Receivers (fig. 1–4). The main and diversity receivers are physically and electrically identical, except for the addition of a cover over five switches on the diversity receiver. The functions performed by these switches are accomplished by their counterparts on the main receiver. The covered switches are not used during normal equipment operation. The selection of the local or remote mode of operation and automatic gain control (agc) time constant for both receivers is made at the main receiver only. All other functions, including application of power or circuit testing, are accomplished individually at each receiver. A display of the selected agc time constant for each channel is provided on the main and diversity receivers. Fault or abnormal conditions are also displayed on the respective receivers. The modules and the internal circuits can be reached by removing the top and bottom protective covers. The modules are removable from the top chassis assembly by removing the attaching hardware and the coaxial connectors. Input and output connections to the main and diversity receivers are made at the rear panel. Each receiver has its own forced air cooling system employing a blower motor and a front panel replaceable filter. Internal maintenance controls are located on the top chassis immediately behind the front panel assembly. These controls can be reached by partially withdrawing the receiver from the electrical equipment cabinet.

d. Automatic Frequency Control. The automatic frequency control, when activated, compensates for frequency drift of a received signal, provided a carrier is transmitted. The output of this component, 22 MHz ± 2 KHz, is applied to the synthesizer to generate the variable injection frequency needed to tune the main and diversity receivers. A sample of the received 1.75-MHz carrier signal is taken from the main or diversity receiver and compared in the automatic frequency control to a 1.75-MHz fixed-reference frequency supplied by the synthesizer. When the received signal is exactly the same frequency as the frequency to which the main or diversity receiver is tuned, the output of the automatic frequency control is maintained at 22 MHz. Any deviation (up to ± 2KHz) of the carrier from the synthesizer 1.75-MHz fixed-reference frequency will produce a corresponding deviation in frequency of the 22-MHz output of the automatic frequency control. This frequency deviation will cause the synthesizer to maintain the main or diversity receiver tuning at the actual received frequency. All local operator controls are on the front panel. A circuit breaker provides protection for the alternating current (ac) powerline to the component. Both the local and remote operators have the option to select automatic frequency control circuitry. The local operator also has the capability to search for an incoming carrier that may have deviated from its assigned frequency. A fine tune control on the automatic frequency control allows the operator to manually tune the receiving set to ± 2 KHz of the frequency selected on the synthesizer. The automatic frequency control utilizes modular construction for all subassemblies. The subassemblies and internal circuitry can be reached by removing the top and bottom covers. The modules can be removed by removing the mounting hardware and the coaxial connectors. A 24-position circuit test switch on the front panel is used to monitor critical circuit parameters. A forced air cooling system is included in this component. Input and output connections are made at the rear panel.

e. Audio Monitor (fig. 1–6). The audio monitor is comprised of power control circuits, line amplifiers and equalizers for each of the eight audio channels (four channel pairs), and metering circuits. A front panel mounted speaker permits the audio, selected from one of eight channels, to be monitored aurally. A 600-ohm headset may be used in place of the speaker through a telephone jack. The output level of any channel may be measured on a front panel volume unit (vu) meter. The application of prime power to the major compo-

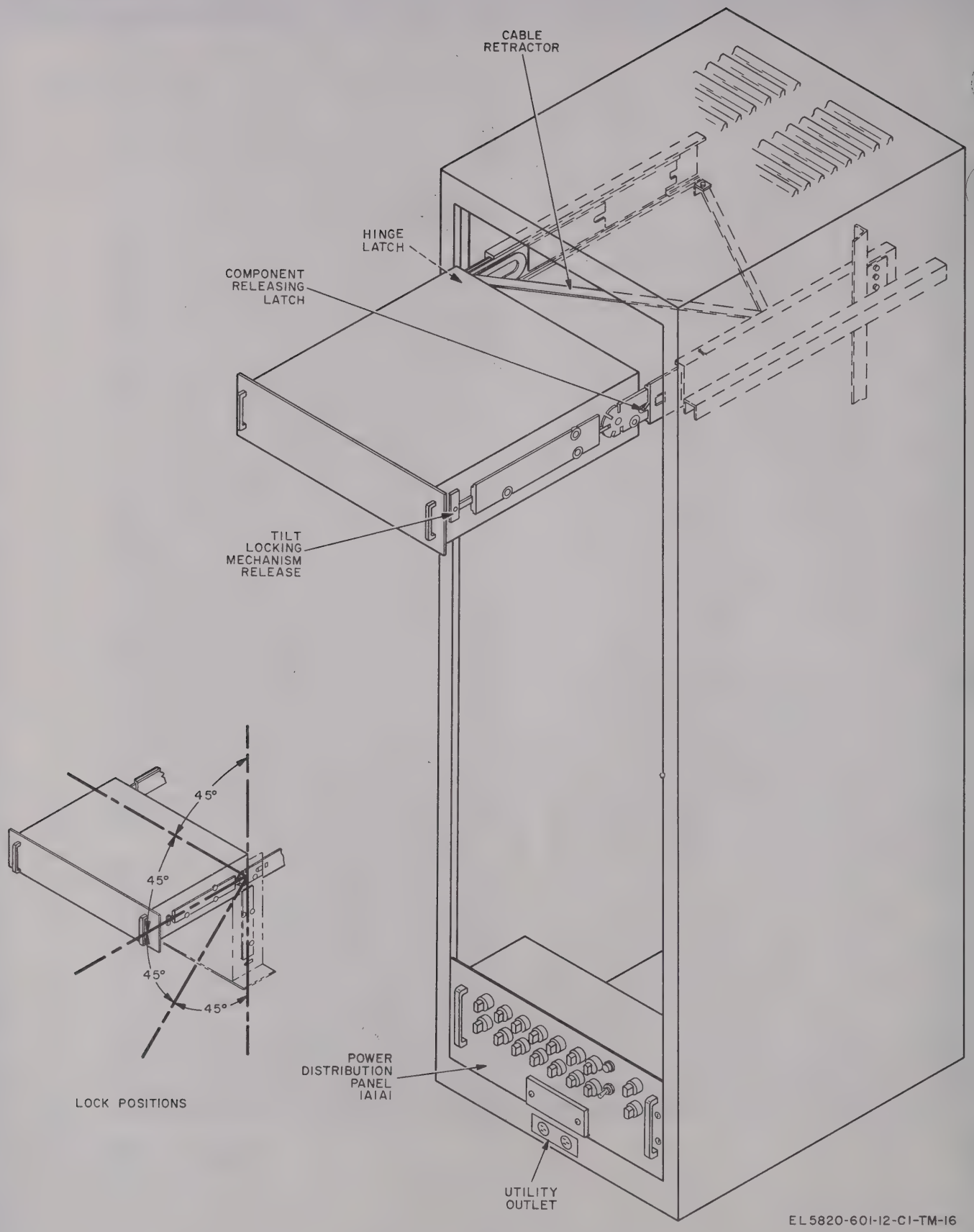

Figure 1–11. Cabinet, Electrical Equipment CY–6450/FRR–79, front view.

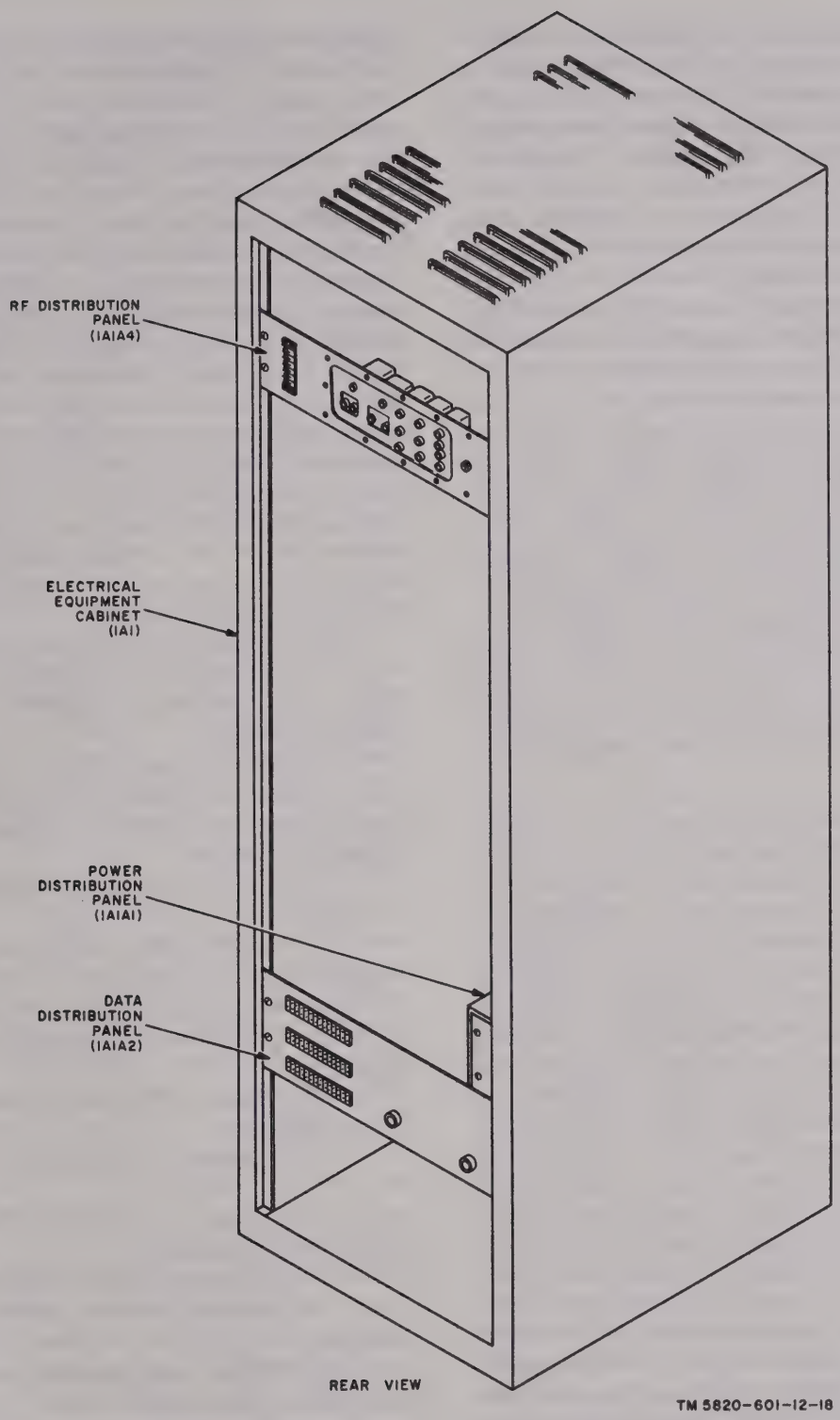

Figure 1-12. Cabinet, Electrical Equipment CY-6450/FRR-79, rear view.

nents of the electrical equipment cabinet is controlled by a front panel switch. The audio monitor is continuously connected to prime power. An 18-volt battery and a battery charger are used to provide power for the synthesizer frequency standard oven and the control converter memory. Channel selection for the audio or metered outputs is controlled by a selector switch. All chassis-mounted subassemblies are of modular construction. The modules can be reached by removing the covers. A 24-position selector test switch is used to monitor power audio amplifier circuits, and control converter memory drain.

f. Remote Control Subsystem. The remote control subsystem consists of the control converter and the remote control which are interconnected through the full duplex control data circuit. One loop provides serial transfer of control data from the remote control (fig. 1–8) to the control converter (fig. 1–7); the other loop provides serial transfer or readback data from the control converter to the remote control. Interface between the remote control and the control converter is established at the data distribution panel (fig. 1–12).

(1) *Control converter* (fig. 1–7). The control converter is composed primarily of printed circuit cards and plug-in modules mounted within the chassis. A cover is provided for both the top and bottom of the component. The only operator control on the front panel is a power switch. A pair of indicators, used in conjunction with the ac power circuit to internal blowers, light to indicate a blown fuse. A second pair of indicators is used for power and link fault indication. In addition to performing remote control functions, the control converter constantly monitors the status of the receiver group, and sends status messages to the remote control each time a status change occurs. The status messages control the remote control front panel indicators which continuously display the operating status of the receiving set. When the remote control subsystem is not performing control or status functions, it transmits a link check message over the full duplex control data circuit and interconnects the remote control with the control converter. The link check messages verify the integrity of the two telegraph loops, comprising the full duplex control data circuit, at 15-second intervals. Failure of either loop causes link fault indicators on the remote control and the control converter to light.

(2) *Remote control* (fig. 1–8). The remote control provides the remote operator with complete control of the receiving set from a position away from the receiver group electrical equipment cabinet. The remote control can be mounted in a standard 19-inch rack or in any other convenient location. The interior of the unit can be reached by removing the protective covers. The printed circuit modules are mounted in card slots and interconnected by wiring between the mating chassis-mounted connectors. Ac power must be supplied at the remote location. Direct current (dc) power is provided by 5-volt and 28-volt power supplies. Input and output signals, ac power, and control connections are made through connectors on the rear apron of the remote control. The remote control has a forced air cooling system which is similar to that used in the components of the receiver group. The control and display functions of the remote control are given in (*a*) and (*b*) below.

(*a*) *Remote control functions.*

1. Change the diversity receiver frequency from 02,000.0 to 29,999.9 KHz in increments of 100 Hz.

2. Set channel B2, B1, A1, or A2 agc time constant for voice (VO), voice frequency carrier telegraph (VFCT), data, or an unassigned spare position.

3. Set the diversity receiver to operate or standby.

4. Set the diversity receiver automatic frequency control to on or off.

(*b*) *Remote display indications.*

1. Main and diversity receivers ready for traffic.

2. Main and diversity receivers in operate or standby.

3. Automatic frequency control on or off.

4. Main and diversity receivers channel agc time constants.

5. Frequency readout accuracy.

6. Remote control manual override or available.

7. Main and diversity receivers summary fault.

8. Remote control command fault.

9. Remote control data link fault.

g. RF Distribution Panel (fig. 1–12). The RF distribution panel is bolted to the vertical mounting rails at the rear portion of the electrical equipment cabinet immediately above the synthesizer. This panel consists of five hybrids (1A1A1 through 1A1A5), terminal board TB1, and AN-type connectors. Hybrids 1A1A1, 1A1A2, and

1A1A3 are passive dividers that provide coupling and isolation for the fixed frequency carrier injection signals (1.743710, 1.756290, and 1.75 MHz) fed from the synthesizer to the main and diversity receivers. Hybrid 1A1A3 provides an additional 1.75-MHz signal to the automatic frequency control. Hybrids 1A1A4 and 1A1A5 are amplifier hybrid assemblies that route synthesizer local oscillator and variable frequency oscillator signals (130, 140, and 150 MHz; and 151.75 to 161.7499 MHz) to the main and diversity receivers. Power required to operate the active hybrids is fed to terminal board TB1 from the audio monitor through the electrical equipment harness. An external 1-MHz frequency standard, when used is routed from its source directly through an N-type connector on the RF distribution panel to the synthesizer.

h. Data Distribution Panel (fig. 1–12). The data distribution panel is bolted to the bottom portion of the vertical mounting rails at the rear of the electrical equipment cabinet. This panel is composed of three terminal boards (TB1, TB2, and TB3) and two antenna protectors, one each for the main receiver and the diversity receiver. Terminal board TB1 has several functions: It interconnects the remote control with the control converter in the electrical equipment cabinet, it routes power from the audio monitor to the antenna protectors, and it connects the antenna relay return lines from the antenna protectors to their respective receivers. Terminal boards TB2 and TB3 provide audio output connections from the main and diversity receivers to external terminal equipment in the facilities control. The antenna protectors disconnect the main and diversity receivers from the antennas when the receiving set is off, and during a main and diversity receivers' tuning cycle. These devices protect the main and diversity receivers from stray incoming signals that may damage front end circuitry during a deenergized condition; they also prevent oscillations that exist in the main and diversity receivers preselectors during the tuning cycle from feeding back into the antennas. The antenna protectors are sealed units which contain a relay, a resistance-capacitance network, and a low-pass filter. The electrical connection from each receiver to its respective antenna is made when the relay is energized. The relay is energized only during normal operation.

i. Power Distribution Panel (fig. 1–11). The power distribution panel occupies the bottom level in the electrical equipment cabinet. This panel routes main ac power from the external prime power source to the synthesizer, the main and diversity receivers, the automatic frequency control, the audio monitor, and the control converter. Input ac power for the electrical equipment cabinet is connected to terminal board TB1 inside the rear panel of the power distribution panel. The front panel consists of a main ac power switch, a main power indicator, and 16 indicating fuseholders. The main input power circuit is protected by two 10-ampere fuses. A pair of 3-ampere fuses is used in conjunction with each of the six ac supply circuits which feed the major components of the receiver group. A pair of 10-ampere fuses protects the ac output to the utility outlet at the front of the electrical equipment cabinet. The fuse-fault indicator assemblies provide a visual indication of a blown fuse. A spare fuseholder which contains two 10-ampere fuses and four 3-ampere fuses is located on the front panel. The fuses can be reached by removing a protective cover. During standby, ac power is supplied to only the audio monitor and the control converter. The audio monitor (fig. 1–6) uses a battery/battery charger circuit to supply standby dc power to energize the crystal oven in the synthesizer and control converter memory circuits. A +18-volt regulated power supply maintains the crystal oven in the automatic frequency control. During a prime power failure, the audio monitor continues to supply dc power to the synthesizer oven and the control converter memory by use of the battery. During operation, each component of the receiver group is energized by its own internal power supply. All component power supplies operate from the ac power provided by the power distribution panel (fig. 1–11). The remote control contains internal power supplies, and obtains its input power from the prime power source at the remote location.

j. Fault Interlock Circuit. The receiver group uses a fault interlock circuit to alert the operator to an equipment malfunction. Fault lamps on the synthesizer, the main and diversity receivers, the automatic frequency control, and the audio monitor light to indicate the presence of a failure. A fault indication results when the power supply outputs of the individual major components drop below the useable level, or if any of the following conditions occur:

(1) Loss of prime ac power.

(2) Loss of synthesizer outputs (fixed or variable frequency oscillator (VFO) injection).

(3) Band selection failure.

(4) Overload.

(5) Tune fault.

k. Receiving Set Component Interface. The components of the receiving set are normally installed in an environmentally controlled, fixed-station facility. The required power, audio, RF, and control interface cables (not supplied) are fabricated to the individual installation site floor plan and cable routing distribution frame. Primary power cables (not supplied) are routed from the existing fixed-station power distribution panel to the receiving set. RF transmission lines from the main and diversity antennas (not supplied) are connected to the receiving set at the data distribution panel. All required interconnecting cables are fabricated to the individual installation site floor plan and cable routing requirements.

1–10. Additional Equipment Required for Operation

The following equipment is not supplied as part of Receiving Set, Radio AN/FRR–79 but is required for use with it.

a. Power Source. An alternating current power source, capable of supplying 115 or 230 volts ±10 percent, 47.5 to 440 Hz at 600 volt-amperes, is required to operate the equipment contained in the electrical equipment cabinet. An ac power source of 115 or 230 volts ±10 percent, 47.5 to 440 Hz at 60 volt-amperes is required to operate the remote control.

b. Communications Antenna. A high frequency (HF) antenna, such as a broadband rhombic or log periodic antenna matched to an impedance of 50 ohms over a frequency range of 2 to 30 MHz, is required. Separate antennas are required for the main and diversity receivers. The spacing between antennas should be at least two wavelengths. A matching balun transformer may be needed for each antenna to insure that the receivers terminate into a 50-ohm load over the entire operating frequency range.

CHAPTER 2
INSTALLATION

Note. Installation of this equipment should be performed by a communication equipment maintenance technician.

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2–1. Siting
(fig. 2–1 and 2–2)

a. Local. The following facilities for the electrical equipment cabinet and remote control unit 2 must be provided at the local installation site:

(1) Floor loading and space requirements as shown in figures 2–1 and 2–2.

(2) A source of primary ac power: 115 or 230 volts ± 10 percent, 47.5 to 440 Hz at 600 volt-amperes (maximum).

(3) Cable trays suitable for supporting and routing primary power, audio, control data, signal, and RF cables to and from existing station facilities.

b. Electrical Equipment Cabinet. Plan the location of the electrical equipment cabinet carefully. Locate the cabinet as close as possible to equipment with which it will be associated. Select a location that will not subject the equipment to excessive heat, dust, or humidity. The overall weight of the electrical equipment cabinet is approximately 600 pounds with all components installed. However, more than half of the weight is taken up by the major components all of which, with the exception of the power distribution panel 1A1A1, data distribution panel 1A1A2 and RF distribution panel 1A1A4 are mounted on slides and can be extended from the cabinet. For that reason, the cabinet *must* be bolted to the building floor. Four mounting holes are drilled in the cabinet bottom mounting plate to accommodate facility supplied mounting hardware. Floor loading must be adequate to withstand the cabinet weight and provide a more than marginal safety factor. The receiving set will operate locally at the front of the electrical equipment cabinet and serviced both from the front and rear. The minimum clearances specified in figure 2–1 should provide enough room to perform these functions. However, make certain that the front clearance is also free of protrusion of adjacent equipment or building structures. This is especially significant since the major components will be removed and installed from the front of the electrical equipment cabinet. Backing into a protrusion during a removal operation may cause personal injury and damage to the equipment.

c. Remote Control (Unit 2). (fig. 2–2) The remote control may be mounted in a standard 19-inch equipment rack or a console. The remote station installation site must provide the following facilities.

(1) Floor loading and space requirements as shown in figure 2–1 and 2–2.

(2) A source of three wire, single phase. 115/230, 47.5 to 440 Hz vac primary power capable of providing 60 watts.

(3) A 20 ma or 60 ma neutral full duplex control data loop.

(4) A 130-volt dc full duplex control data loop battery supply.

2–2. Unloading and Placement
To assure proper placement of the equipment for installation, proceed as follows:

a. Unload equipment near the installation site.

b. Place the individual crates as close to their final position as possible. Sufficient space must be allowed around each crate to provide for unpacking.

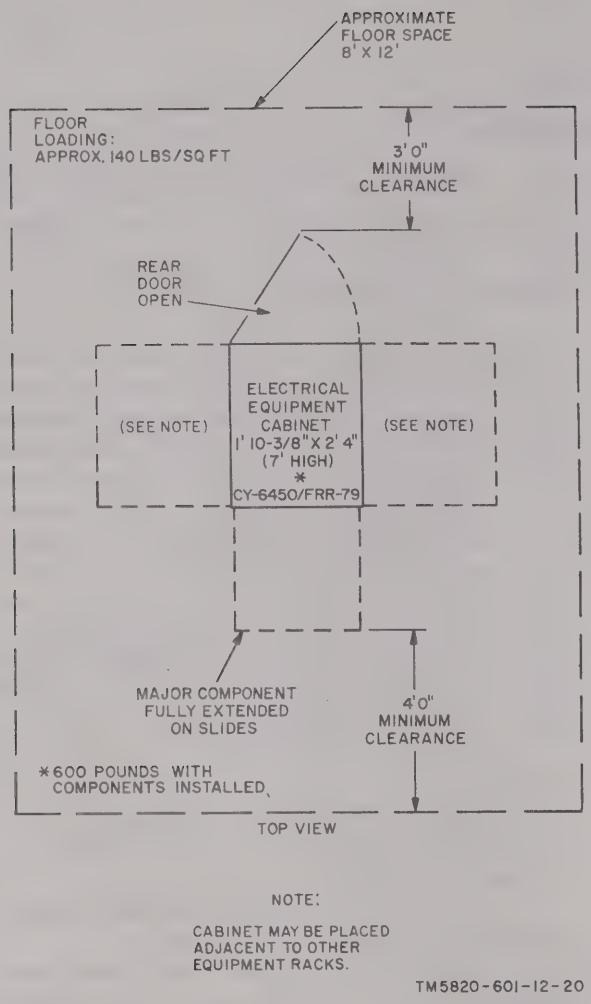

Figure 2–1. Electrical equipment cabinet, floor plan.

2–3. Unpacking

a. General. Locate the crate containing the electrical equipment cabinet as close to the final installation site as possible. A forklift capable of handling 2000 pounds should be used to position the crate for unpacking. Once the packing material is removed, a hoist lift can be employed to place the equipment in the exact position. Due to the light weight and size of the remote control, it can be carried to the installation site by hand.

b. Packing Data. When packed for shipment, the components of the receiver set are packed

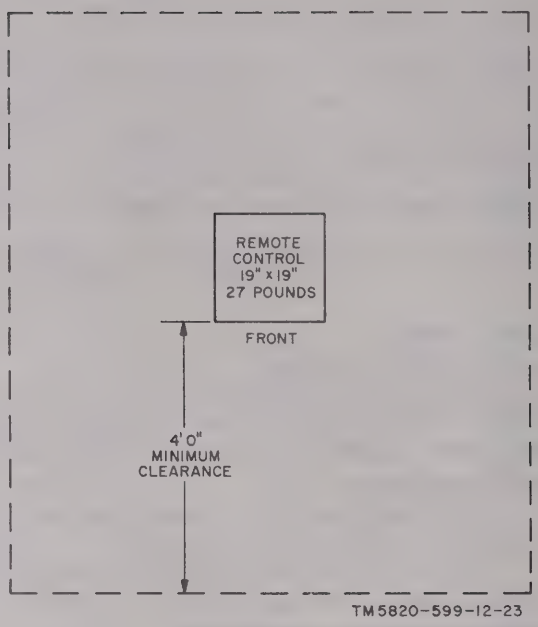

Figure 2–2. Remote control, floor plan.

in three wooden boxes. The electrical equipment cabinet is placed in a moisture proof barrier bag and packed in a wooden packing box. The packing arrangement for this equipment is shown in figure 2–3. Each receiver group component and remote control are packaged separately. A typical packaging diagram is shown in figure 2–4. The following table provides packing data for the three wooden boxes.

c. Removing Contents. Use the following procedure to remove the contents from the wooden crates:

(1) *Unpacking electrical equipment cabinet 1A1* (fig. 2–3). Perform procedures below when unpacking the electrical equipment cabinet.

(*a*) Clip metal strap from the outside of the wooden packing box.

(*b*) Remove the nails that secure the top and sides of the wooden packing box using a nailpuller.

(*c*) Lift off wooden cover and remove bonded fiber cap.

(*d*) Remove the barrier bag, single face paper, and desiccant.

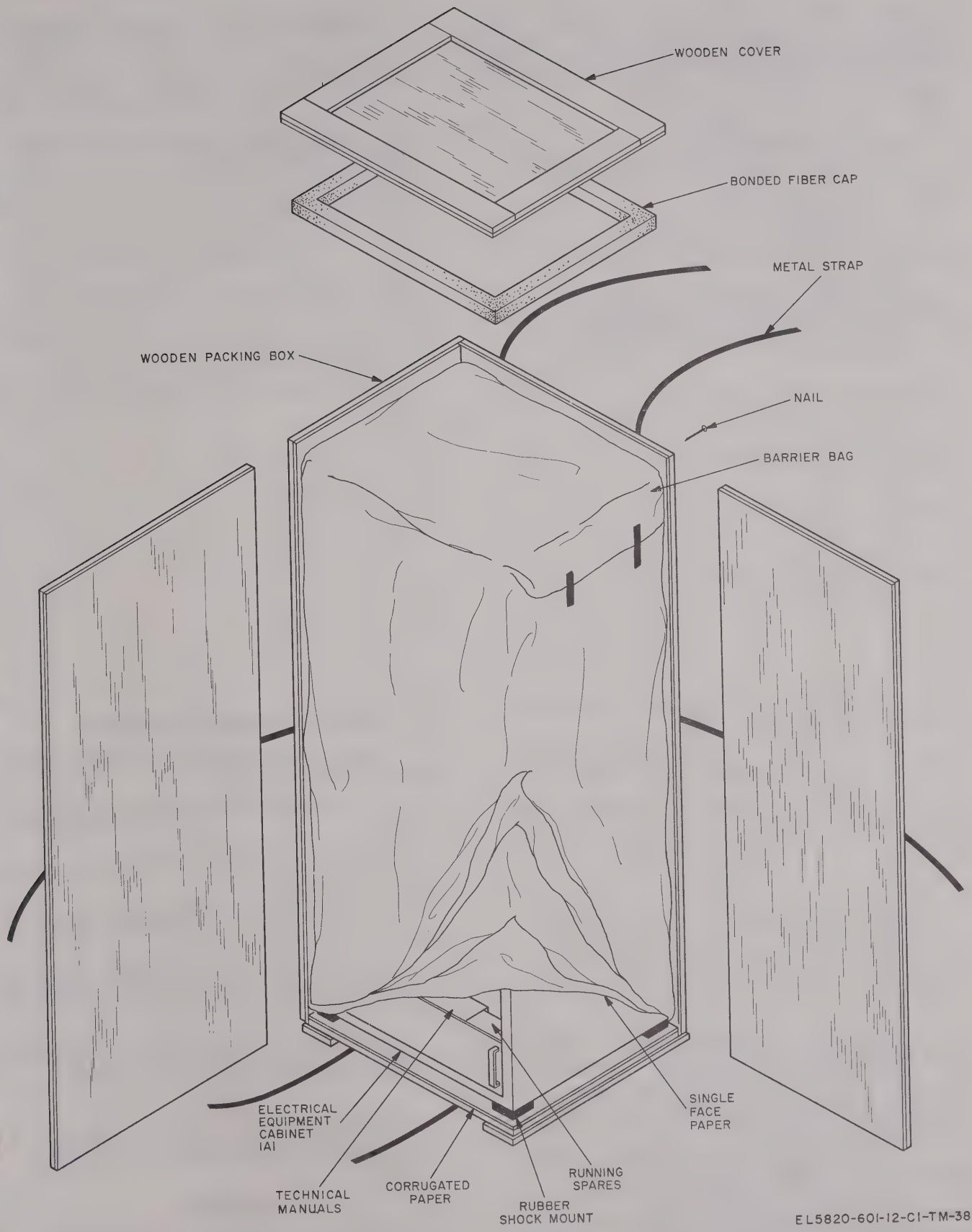

Figure 2-3. Packaging of electrical equipment cabinet.

Contents	Case	Dimensions (in est)	Volume (cu ft)	Weight (est lb)
	1 of 3	36 x 29 x 90¼	56	466
Electrical Equipment Cabinet CY-6450/FRR-79		23 x 28 x 84		325
One box which holds eight smaller boxes		12 x 6 x 6		
Eight boxes containing lamps and fuses		2 x 1 x 3		
	2 of 3	56⅛ x 48⅛ x 27⅜	44	476
Control Converter C-7666/FRR-79		19 x 19 x 5¼		30
1 box (inner)		24 x 20 x 18		
1 box (outer)		25 x 21 x 19		
Main Receiver R-1543/FRR-79		20½ x 19 x 5¼		50
1 box (inner)		24 x 20 x 18		
1 box (outer)		25 x 21 x 19		
Diversity Receiver R-1543/FRR-79		20½ x 19 x 5¼		50
1 box (inner)		24 x 20 x 18		
1 box (outer)		25 x 21 x 19		
Automatic Frequency Control C-7665/FRR/79		19 x 19 x 5¼		30
1 box (inner)		24 x 20 x 18		
1 box (outer)		25 x 21 x 19		
	3 of 3	53¾ x 37 x 28½	28	400
Audio Monitor 1D-1562/FRR-79		19 x 19 x 7		70
1 box (inner)		24 x 20 x 18		
1 box (outer)		25 x 21 x 19		
RF Distribution Panel 20006-505A1				20
1 box (inner)		21¼ x 6½ x 8⅜		
1 box (outer)		21⅝ x 6¾ x 9		
Synthesizer C-1488/FR		21½ x 19 x 5¼		70
1 box (inner)		28¼ x 20⅛ x 8¼		
1 box (outer)		28¾ x 20½ x 9¼		
Remote Control C-7667/FRR-79		19 x 19 x 5¼		30
1 box (inner)		25¼ x 21⅞ x 8¼		
1 box (outer)		26¼ x 22⅜ x 9¼		

(*e*) Remove the unit from the skid by removing four mounting bolts.

(*f*) Remove running spares, technical manuals, and battery package from cabinet.

(2) *Unpacking receiver components and remote control unit* (fig. 2–4). Perform procedures below when unpacking a component:

NOTE

Unpacking procedure is the same for all the components. However, a minimum of two men and a forklift are required to unpack and lift any components over 50 pounds.

(*a*) Clip metal straps, remove nails and then wooden cover and bonded fiber top cushion.

(*b*) Lift outer carton from wooden packing box. Bonded fiber cushioning may remain in the wooden packing box.

(*c*) Open the outer carton and moisture-water-proof barrier within the outer carton.

(*d*) Remove the inner carton.

(*e*) Open the inner carton and remove the corrugated filler and desiccant.

(*f*) Remove the component.

2–4. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment as follows:

(1) Examine all equipment for visible signs of damage.

(2) Check all controls for binding, broken knobs, or bent shafts.

(3) Check meters and indicator lamps for cracked or broken glass.

(4) Check that fuses are properly seated in their holders and that all circuit breakers are tripped.

(5) Check that cable harnesses and slide assemblies operate smoothly with no binds.

NOTE

If the equipment has been damaged, follow the procedure outlined in paragraph 1–3*b*.

WARNING

Do not slide or mount any components into the electrical equipment cabinet until installation procedures (para 2–6)

have been completed. *To do so may cause the cabinet to tip over.*

(6) Inspect battery for signs of damage to its case or to the terminals.

b. See that the equipment is complete by checking the equipment against the basic issue item list. Report all discrepancies in accordance with TM 38-750. Shortages of a minor assembly or part that does not affect proper functioning of the equipment, should not prevent use.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Check to see whether the MWO number (if any) and appropriate notation concerning the modification have been entered in the manual.

NOTE

Current MWO's applicable to equipment are listed in DA Pam 310-7.

2-5. Tools and Materials Required for Installation

Tools, test equipment, and materials required for installation of the receiving set are listed below. The use of each item is also listed.

a. Tools.

Quantity	Item	Use
1 set	End wrenches ¼" to 1¼" standard length	Installation of equipment.
1 set	Socket wrenches ¼" to 1¼" with ½" drive.	Installation of equipment.
1 set	Standard electrician tool kit no. TK 105/G	Installation of interface cables.
1	Forklift truck, 2,000-pound capacity	Unloading and positioning equipment.
1	Hoist; 2,000-pound capacity	Unloading and positioning equipment.
1 set	Allen wrenches ⅛" to ¼"	Installation of primary power cables and adjustment of parts.
1	Tool, special	Removal of protective cover from terminal strips.

b. Test Equipment. None required.

c. Materials.

Quantity	Item	Use
4	⅜" hex head bolt and threaded expansion anchor.	For securing electrical equipment cabinet to building floor.
4	⅜" ID, flat washer	Same as above.
4	⅜" ID, lock washer	Same as above.
4	⅜" ID, flat washer 3 in. OD	Same as above.
4	6–32×5/8 screws, lock washers, and flat washers (equipment cabinet shipped with hardware mounted in position).	To mount RF distribution panel in electrical equipment cabinet.
Length as required	1½-inch-diameter rigid conduit (BX) with three 14 AWG conductors (single conductor).	To provide ac power to electrical equipment cabinet.
Length as required	Cable assembly. Fabricate as shown in figure 2–21.	1 MHz external standard.
Length as required	Cable assembly. Fabricate as shown in figure 2–20.	Station RF main and diversity antenna interface to electrical equipment cabinet.
Length as required	No. 22 AWG (2 shielded conductors)	Station audio interface to electrical equipment cabinet.
Length as required	No. 22 AWG (4 shielded conductors)	Station full duplex control data interface to electrical equipment cabinet.
Length as required	No. 22 AWG (4 shielded conductors). Fabricate as shown in figure 2–16.	Remote station full duplex control data interface to remote control.
Length as required	No. 16 AWG stranded (3 conductors). Fabricate as shown in figure 2–18.	To provide ac power to remote control unit.
Amount as required	Distilled or deionized water	To activate battery pack.

2–6. Installation of Electrical Equipment Cabinet

a. General. Use the following procedures to position the electrical equipment cabinet, secure it to the building floor and to connect the primary ac source cable.

b. Electrical Equipment Cabinet Positioning and Bolt-Down. Position and bolt-down the electrical equipment cabinet as follows:

(1) Refer to installation site station drawings for cabinet location specifications.

(2) Refer to figure 2–5 for electrical equipment cabinet template.

(3) Using a hoist or forklift truck, place cabinet near its permanent position.

(4) Remove rear access door and panel from cabinet by pulling down on spring loaded pin (upper right-hand corner).

(5) To facilitate installation of cabinet the power distribution panel 1A1A1 may be removed as follows:

(*a*) Disconnect connector W2P1 at the rear of the power distribution panel (fig. 1–12).

(*b*) Remove the screw securing utility outlet cover to outlet (fig. 1–11).

(*c*) Remove the two screws holding utility outlet power box to electrical equipment cabinet.

(*d*) Remove the four captive screws securing power distribution panel to mounting

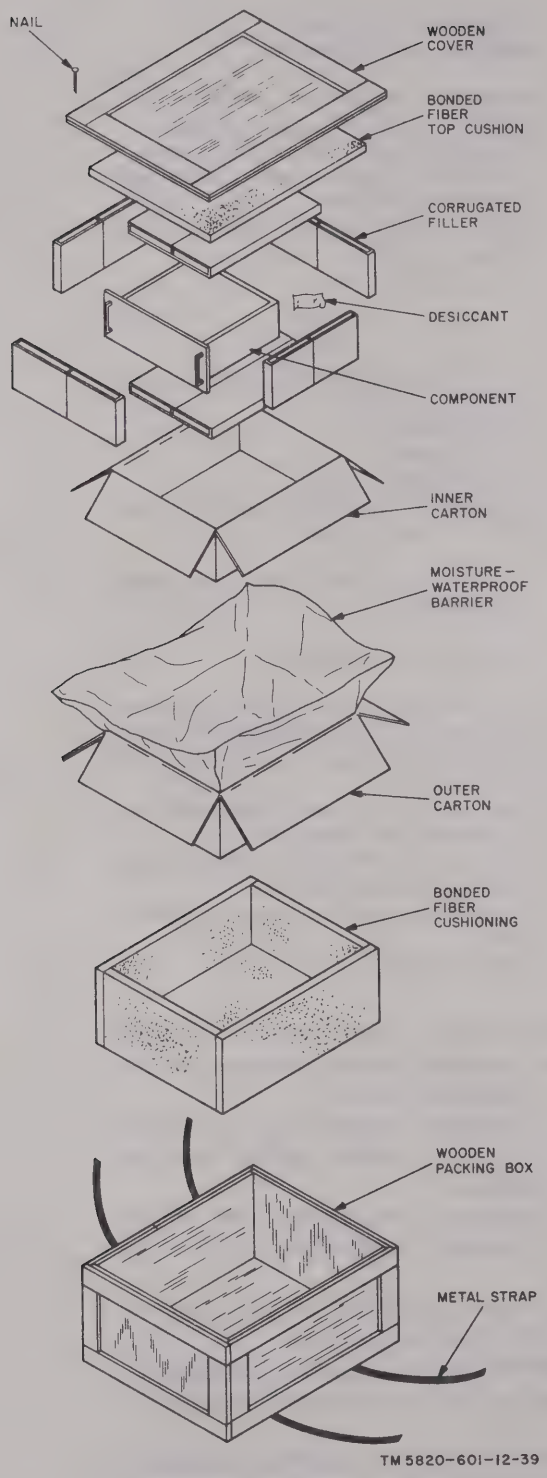

Figure 2–4. Packaging of component, typical.

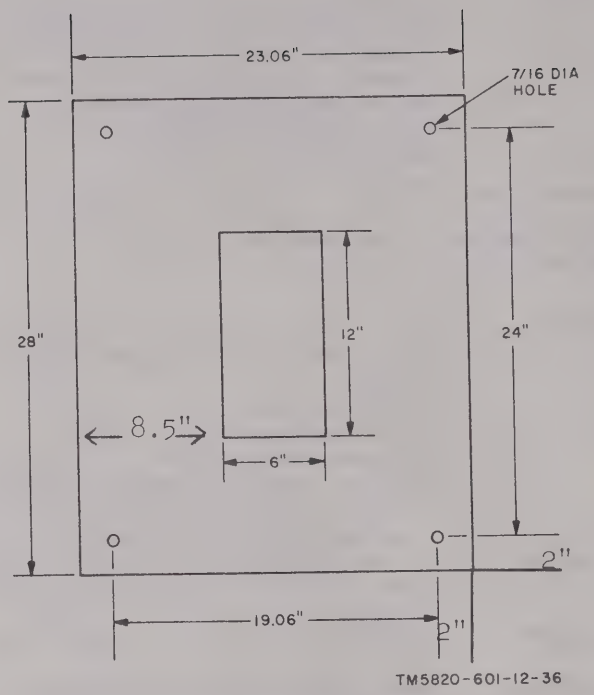

Figure 2–5. Electrical equipment cabinet, base template.

rails to completely free panel. Carefully remove from cabinet.

(6) Using the dimensions shown on figure 2–5, prepare an actual size template out of stiff cardboard or similar material. Make certain that holes are spaced accurately.

(7) Place fabricated template on the floor in the exact area to be occupied by the electrical equipment cabinet. Drill four 7/16-inch holes to a depth equivalent to the length of a 3/8-inch threaded expansion anchor.

(8) Insert a 3/8-inch threaded expansion anchor into each hole as shown in figure 2–6.

(9) Using hoist or forklift, position cabinet such that cabinet holes in base plate are in alignment with inserted expansion anchors.

(10) Place a 3/8-inch flat washer, 3/8-inch lock washer, and a 3/8-inch ID, 3-inch OD flat washer on a 3/8-inch hex head bolt as shown in figure 2–6.

(11) Insert bolt with washer arrangement into one expansion anchor and tighten. Repeat for three remaining expansion anchors.

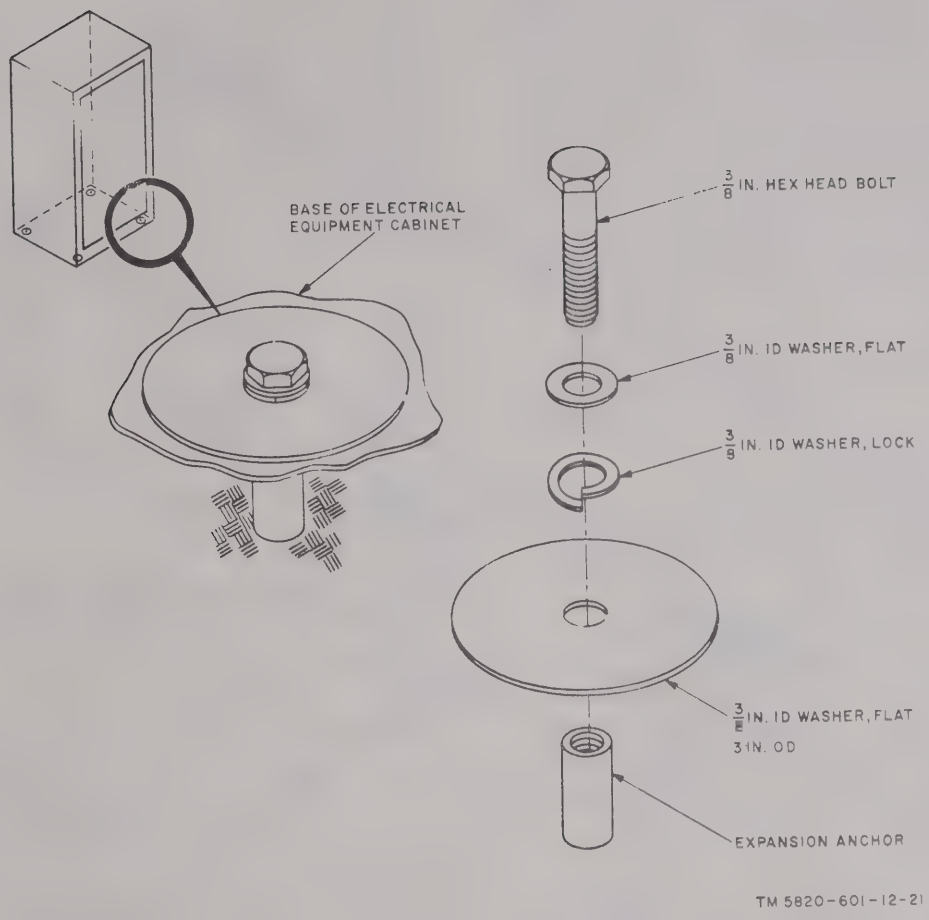

Figure 2-6. Electrical equipment cabinet mounting diagram.

(12) Locate power distribution panel near electrical equipment cabinet so that exact required ac power cable length can be determined.

(13) Remove the 14 screws securing the cover to the rear of the power distribution panel, and remove cover (fig. 2-7).

Warning: **Make sure that station ac power to electrical equipment cabinet is not on during the following procedure.**

(14) Loosen the clamping screw on the BX clamp and slip the station BX cable through with enough slack so that the three conductors reach TB1 (fig. 2-7).

(15) Connect the two hot conductors to TB1-1, and TB1-3. (The color code of the BX conductors may vary from station to station.) Connect the neutral conductor to TB1-2. Tighten the clamping screw.

(16) Replace the cover on the rear of the power distribution panel and replace the component in the electrical equipment cabinet. Reconnect connector W2P1 to J1 and secure utility outlet.

(17) Make sure that the proper value fuses are inserted in the fuse holders on the power distribution panel. The following table shows the value of fuses and its related circuit. See figure 3-7 for fuse locations.

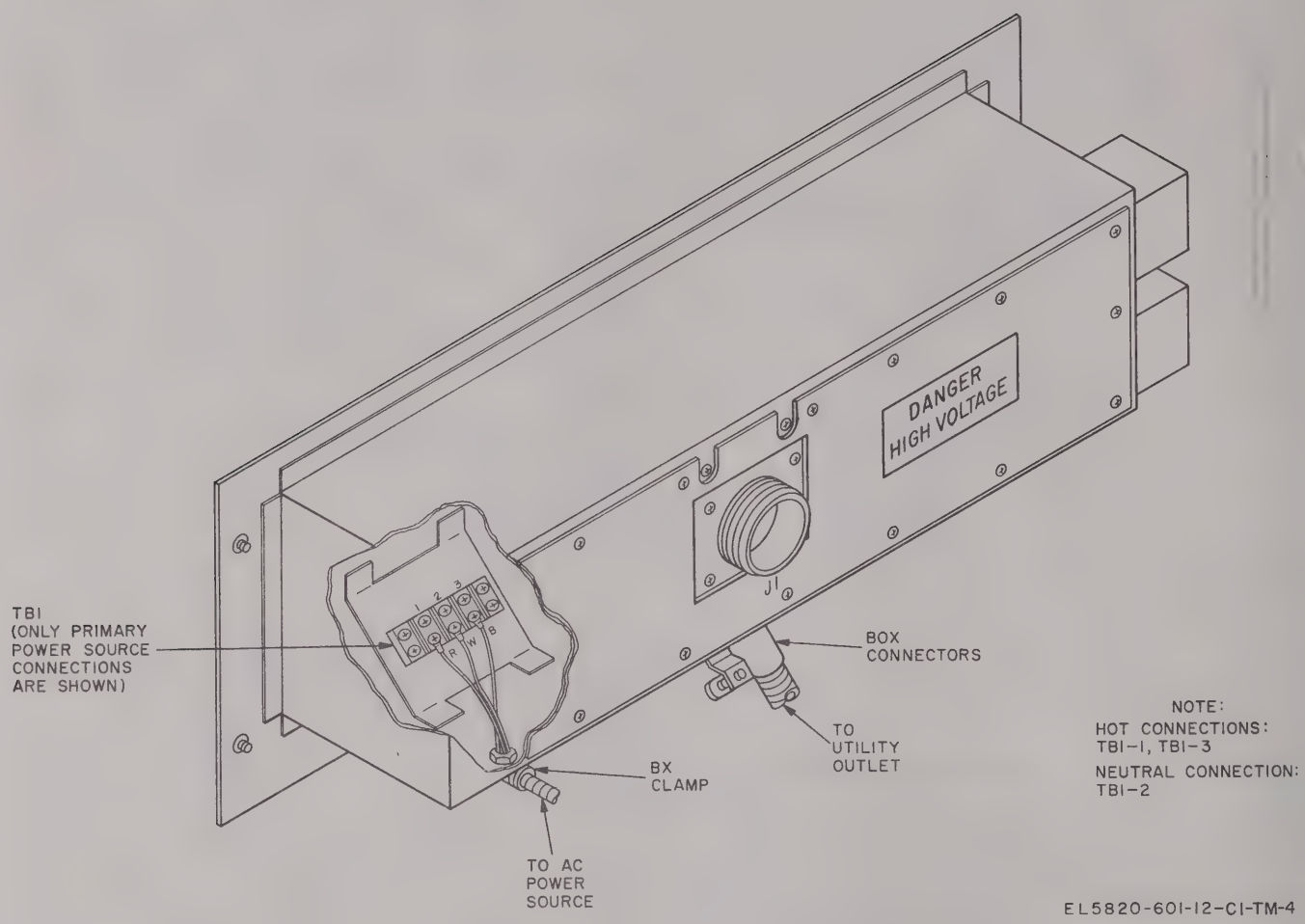

Figure 2-7. Power distribution panel, primary power connections.

Component	*Fuse symbol*	*Rating (amp)*
Ac line fuses on power distribution 1A1A1 panel.		
Synthesizer	F9, F10	3
Main receiver	F5, F6	3
Diversity receiver	F7, F8	3
Audio monitor	F3, F4	3
Control converter	F13, F14	3
Automatic frequency control	F11, F12	3
Utility	F15, F16	10
Receiver group main power	F1, F2	10

2-7. Component Primary 115/230-Volt Power Strapping

Prior to installing the major components into the electrical equipment cabinet, check the primary power available for receiver set operation. If the power available is 115 volts ac, no modifications are necessary since the equipment, with the possible exception of the control converter, is initially set up for 115-volt operation. However, if 230-volt operation is desired, the power supply in each component must be modified as follows:

a. Remove the bottom cover of the components listed below, then remove cover of the component power supply.

(1) 1A2A21 in the synthesizer (fig. 2-8).

(2) 1A3A15 in the main receiver (fig. 2-9).

(3) 1A4A15 in the diversity receiver (fig. 2-9).

(4) 1A5A10 in the automatic frequency control (fig. 2-10).

(5) 1A5A10 in the audio monitor (fig. 2-11).

(6) Locate terminal block TB1 on each power supply using figures 2-8 through 2-11. Note that TB1-1 is strapped to TB1-2 and that TB1-3 is strapped to TB1-4. This strapping is for 115-volt operation only.

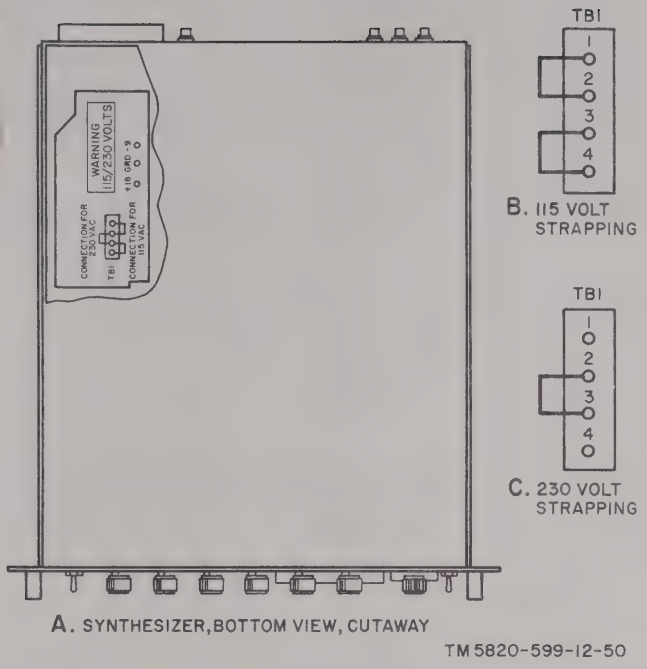

Figure 2–8. Synthesizer, 115/230 volt strapping.

(7) To strap for 230-volt operation, remove all existing straps and restrap as shown.

b. To strap on the control converter for 230-volt operation (fig. 2–12), remove the two screws securing protective cover on terminal board TB1. Remove cover.

NOTE

Use special wrench to remove the two protective cover screws. Avoid use of pliers on surface of screws as this will cause burns and can create a safety hazard.

(1) Remove the five jumper connecting terminals 1 and 3, 2 and 4, 5 and 7, 8 and 11, and 9 and 10. These connections are for 115-volt operation only.

(2) Connect terminals 2 to 3, 6 to 7, 8 to 12, 9 to 11.

(3) Replace the terminal board cover anc retaining screws.

c. Replace all bottom covers.

2–8. Strapping Control Converter for 20/60MA Full Duplex Central Data Loop Operation

The control converter is shipped strapped for 20-ma full duplex control data loop operation. If 20-ma operation is required, no strapping is required. However, facilities are provided which allow for 60-ma full duplex control data operation if required. If after examination of the station full duplex control data loop current characteristics, it is determined that 60-ma operation is required, perform *a* through *e* below. If control converter is strapped for 60-ma full duplex control data loop operation, and it is desired to strap the control converter for 20-ma full duplex control data loop operation, perform *f* through *i* below.

a. Remove top cover by turning the screw-type fasteners two turns counterclockwise, and lift the top cover off.

b. Locate and remove line isolation receive module card 1A7A13 from card slot A13 (fig. 2–12) and locate eyelets E1, E2, and E3 as shown in figure 2–13.

c. Unsolder and remove connections between eyelets E1 and E2.

d. Using a short piece of insulated wire, make strapping connection between eyelets E2 and E3. The stripped ends of the connecting wire should be passed through the eyelets before soldering; the wire should be as short as possible and should lie flat against the printed wiring card. After soldering, clip off the stripped ends of the wire if they are protruding from the opposite side of the card.

e. After completing the strapping procedure, insert printed wiring card into slot A13 and press until card mates with connector at bottom of slot. Replace and secure control converter cover.

f. Perform *a* and *b* above.

g. Unsolder and remove connection between eyelets E2 and E3.

h. Using a short piece of insulated wire, make strapping connection between eyelets E1 and E3.

i. After completing the strapping procedure, insert printed wiring card into slot A13 and press in until card is mated with the connector at the bottom of the slot. Replace and secure control converter top cover.

2–9. Receiver Group Component Installation

The receiver group components are installed into the electrical equipment cabinet from bottom up. Note the position of each component in figure 1–1. Perform *a* through *h* below as a

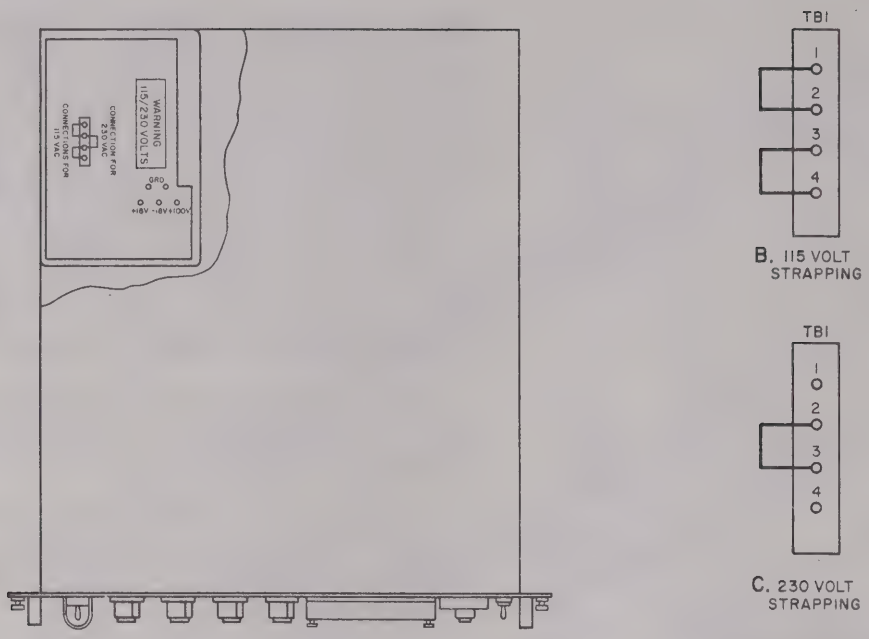

Figure 2–9. Main and diversity receivers, 115/230-volt strapping.

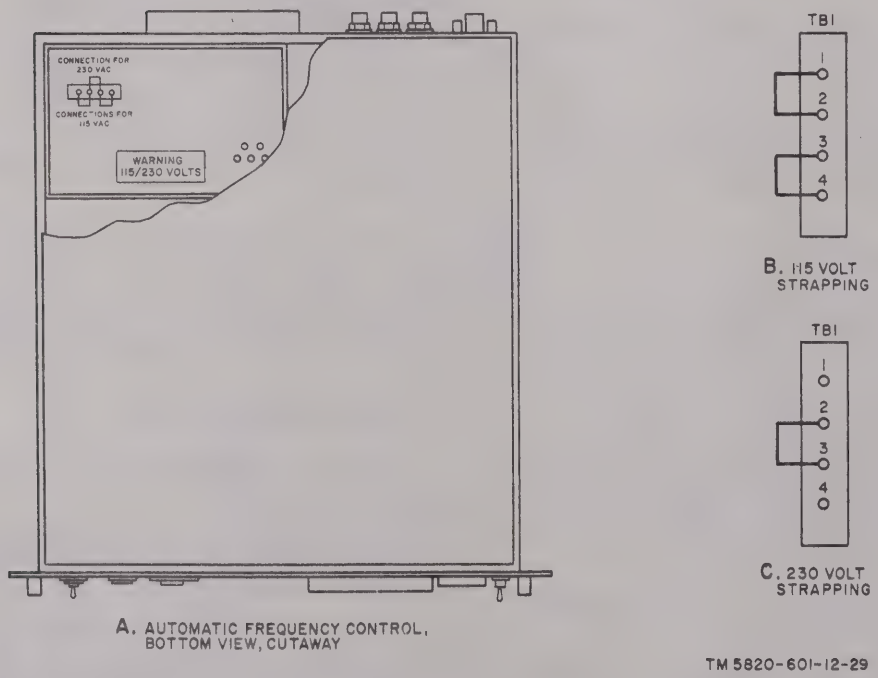

Figure 2–10. Automatic frequency control, 115–230-volt strapping.

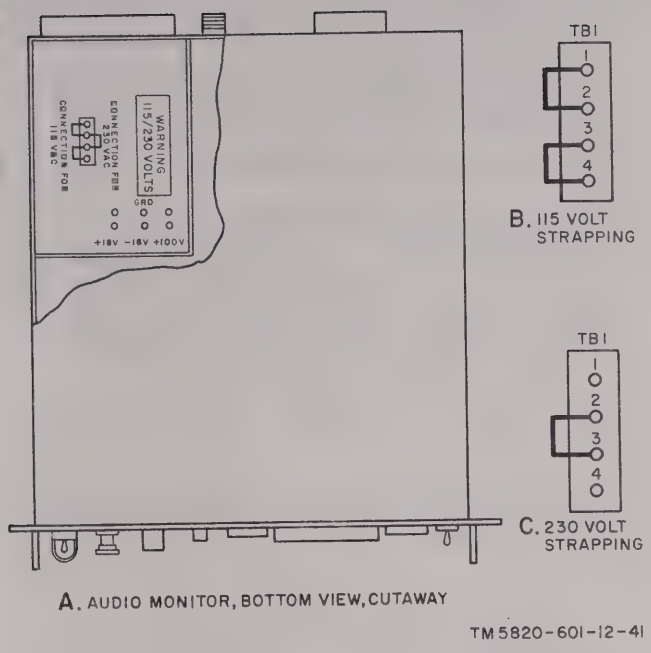

Figure 2–11. Audio monitor, 115/230-volt strapping

general procedure for the installation of slide mounted components. Perform procedure *j* for installation of the RF distribution panel 1A1A4.

NOTE

If necessary, remove all filler panels. Do not install the filler panels, which will occupy the area between the major component front panels, before all major components are placed in the electrical equipment cabinet.

a. Remove all material (tape, string, etc.) used to secure the slides, cable retractors, and cables during shipment.

CAUTION

Make certain that cabinet is securely mounted to floor and that the slides and cable retractors operate freely without binding. If binding occurs, check for damage or other causes of improper movement.

b. Place all switches to the deactivated position.

c. Withdraw the left and right mounting slides from the cabinet until they are locked in their fully extended position.

d. Place the component on the mounting slides and slide the component slowly into the cabinet until stops are engaged.

e. From the rear of the cabinet, reach in and connect (using the pin) the cable carrier hinged bracket to the rear of the component.

f. Using the cording diagram (fig. 6–1), connect the cable connectors and tagged wires from the cable harness to the rear of the components.

CAUTION

Never attempt to rotate a drawer without first disengaging tilt locks. Pull on both tilt lock mechanism releases (fig. 1–11).

g. After the cable retractor and cable connections are in place, check the tilting action of the component (fig. 1–11).

CAUTION

If component cannot be tilted to all positions, except for audio monitor 1A6, check for binding resulting from tangled cables, wires, or improper retractor operation.

h. Press the release buttons on each side of the mounting slides. This will release the stops and allow the component to slide against the cabinet frame.

i. Lock the component in place by rotating the four captive fasteners, at each corner of the front panel, clockwise.

j. Using four screws, mount RF distribution panel on the rear vertical rails approximately 6 inches from the top. Connect cables to RF panel as outlined in figure 6–1.

k. After all components are installed, mount the filler panels in the slots between the component front panels. Secure by use of the captive fasteners.

CAUTION

When removing a component from the electrical equipment cabinet, remove the filler panels above and below the component front panel. Failure to do so may damage the component.

2–10. Activation of Battery Pack 1A6A9

The battery pack (fig. 2–14) is shipped with the electrolyte in the battery in a dry state (paste). Perform the following procedures to activate the battery.

NOTE

The battery is shipped in a package normally inclosed with the technical

manual and spares (fig. 2–3) and should be inserted into its holder in the equipment prior to performing the following steps.

WARNING

The battery electrolyte is very caustic and will harm the eyes and skin. Use all precautions necessary to avoid contacting it. To neutralize, apply 3-percent boric acid solution and wash with water.

a. On the audio monitor (fig. 2–11), remove the top cover by loosening the cover fasteners.

b. Unscrew six captive mounting screws holding battery in place.

WARNING

Make certain the MAIN POWER switch on the power distribution panel is in the OFF position before performing any additional servicing of the battery pack.

c. Disconnect power connector J3 by turning it counterclockwise and pulling straight up, then lift out the battery.

d. Remove battery pack cover by removing the six retaining screws.

e. Unscrew filler caps on cells.

CAUTION

Use only pure distilled or deionized water in the following step. Do not use a filling implement which might have been contaminated by contact with acid from other batteries.

f. Fill cells to LEVEL line with distilled water.

g. Replace battery pack in audio monitor by performing steps *b* through *e* in reverse.

CAUTION

Do not overtighten the vent screws. If electrolyte is discolored or cloudy, refer to higher category of maintenance.

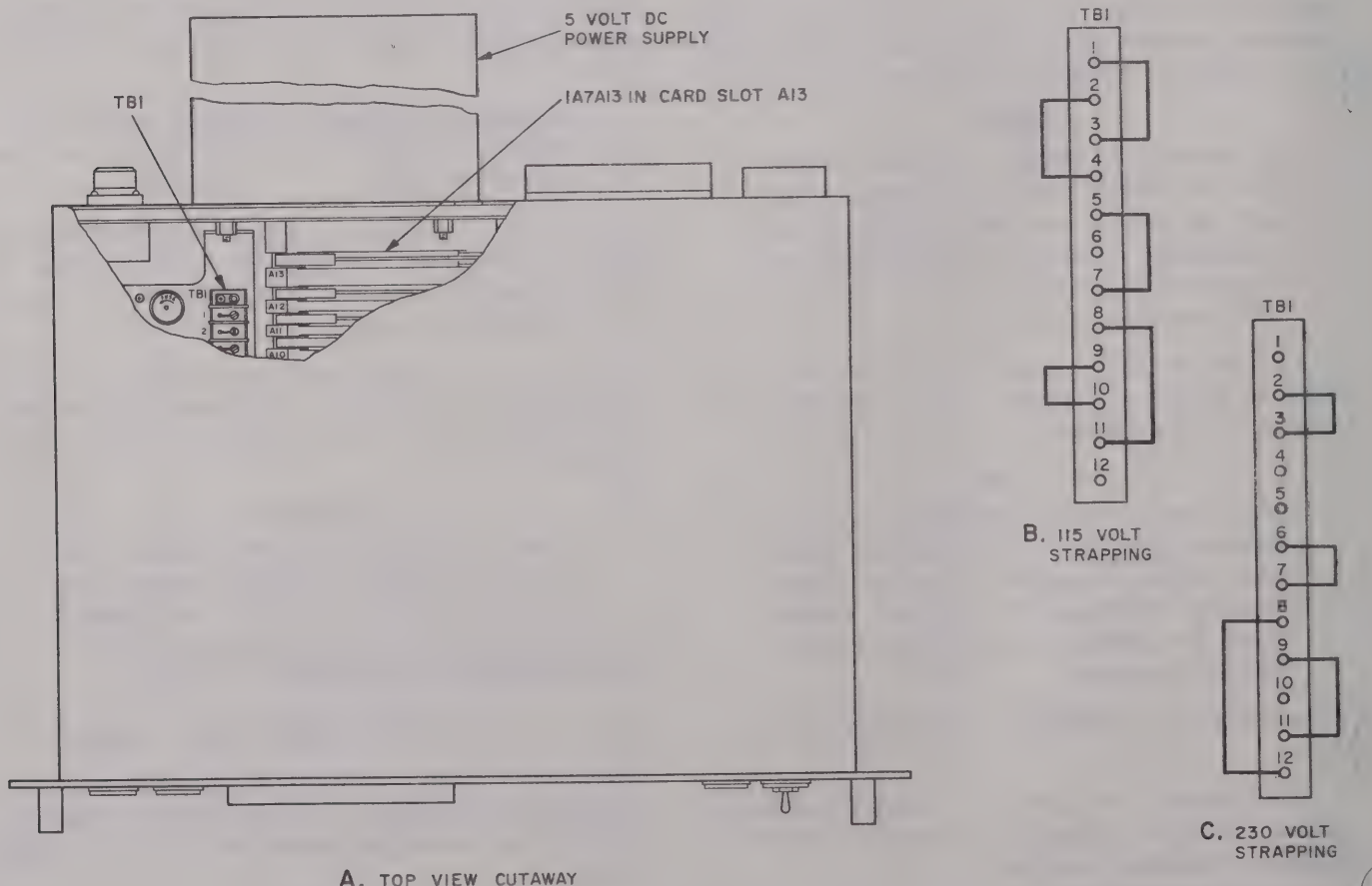

Figure 2–12. Control, converter, 115/230-volt strapping diagram.

WARNING

The battery pack must be in an upright position while charging. Tilting may result in spillage of the electrolyte due to venting action of cells. To neutralize spilled electrolyte, use 3-percent boric acid solution immediately.

h. With power applied to equipment (standby or operate condition), charge battery for at least 24 hours.

i. After 24 hours, place CIRCUIT TEST switch at BAT VOLT. Meter should read in the green area approximately 21.5 vdc.

j. Check electrolyte level. If necessary add distilled water to bring electrolyte to 1/8 inch below LEVEL line.

NOTE

Refer to TM 11–6140–203–15–1, TM 11–6140–203–15–2 and TM 11–6140–203–15–3 for additional information on the type of battery used in this set.

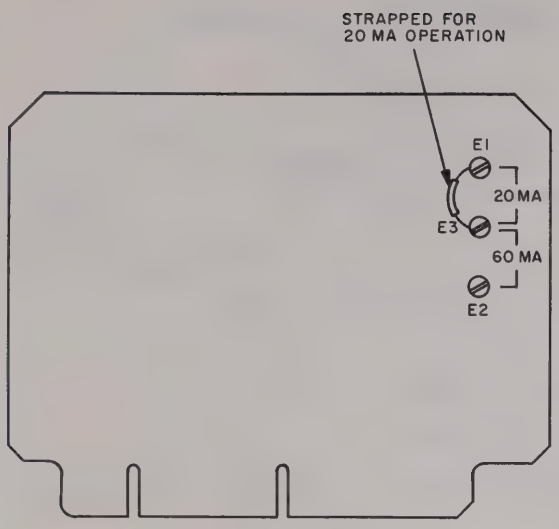

Figure 2–13. Control converter 20/60ma full duplex control data loop strapping.

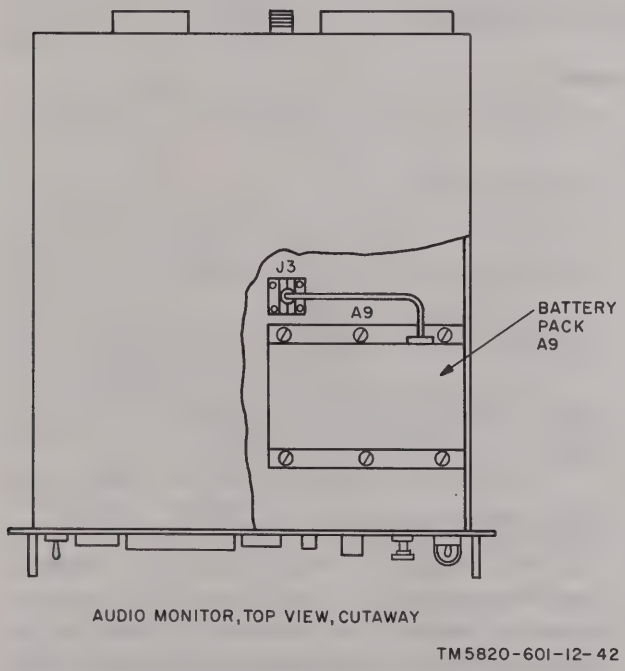

Figure 2–14. Audio monitor, top view.

2–11. Installation of Remote Control

a. General. The remote control is shipped with all modules in place and intraconnected. The installation of the remote control requires the performance of the following tasks:

(1) Loop current strapping.

(2) Positioning and securing within the housing. Housing is not supplied as part of this equipment.

(3) Installation of full duplex control data station interface lines.

(4) Installation of primary power station interface cable.

b. 20/60 Ma Full Duplex Control Data Loop Strapping. Prior to interfacing the station full duplex control data facilities with the remote control perform the following procedures:

Note. As supplied, the remote control is strapped for 20 ma full duplex control data loop operation.

(1) Determine from station maintenance personnel or station records the current characteristics of the control data loops assigned.

(2) If full duplex control data loop characteristics as determined in *b*(1) above is 20 ma, proceed with *d* below.

Note. Refer to (4) below for 20 ma strapping procedure if required.

(3) If full duplex control data loop characteristics as determined in *b*(1) above is 60 ma, proceed as follows:

(*a*) Refer to figure 2–13 and figure 2–5.

(*b*) Remove remote control top cover by turning each (10) screw-type fasteners two turns counterclockwise, and lifting the top cover off.

(*c*) Remove line isolation receive printed wiring module from card slot 2A12 (fig. 2–15) and locate eyelets E1, E2, and E3 as shown in figure 2–13 for card 1A7A13.

(*d*) Unsolder and remove connection between eyelets E1 and E3.

(*e*) Use a short piece of insulated wire to make strapping connection between eyelets E2 and E3. The stripped ends of the connecting wire should be passed through the eyelets before soldering; the wire should be short as possible and should lie flat against the printed wiring card. After soldering, clip off the stripped ends of the wire if they are protruding from the opposite side of the card.

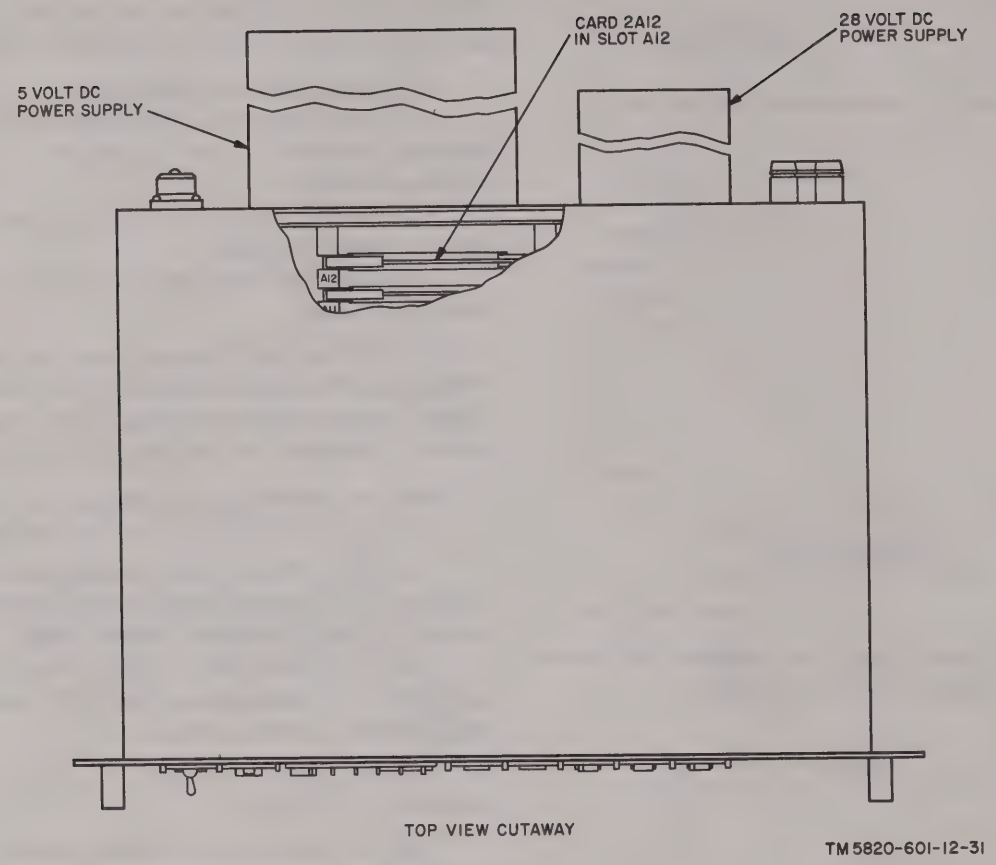

Figure 2–15. Remote control, top view.

(4) To strap for 20 ma full duplex control data loop current operation, remove remote control top cover as described in (3) (*b*) above and proceed as follows:

(*a*) Remove line isolation receive relay printed wiring module from card slot 2A12 (fig. 2–15) and locate eyelets E1, E2 and E3 as shown in figure 2–13.

(*b*) Unsolder and remove connection between eyelets E2 and E3.

(*c*) Use a short piece of insulated wire to make strapping connection between eyelets E1 and E3.

(5) After completing the strapping procedure specified in either (3) or (4) above, insert printed wiring card into slot 2A12, and press in until card is mated with the connector at the bottom of the slot. Replace and secure remote control top cover.

c. Positioning and Securing. To position and secure the remote control, proceed as follows:

(1) Refer to installation site station drawings for remote control location requirements.

(2) Install remote control in standard 19-inch equipment rack or console, which is provided at the installation site.

(3) Secure remote control to rack or console using four front panel captive screws.

d. Full Duplex Control Data Line Connections. Two pairs of control data lines must be connected between the station dc distribution frame and the remote control. One pair (positive and negative in) provide data input to the remote control from the station full duplex control data facilities. The other pair (positive and negative out) provide data output from the remote control to the station control data

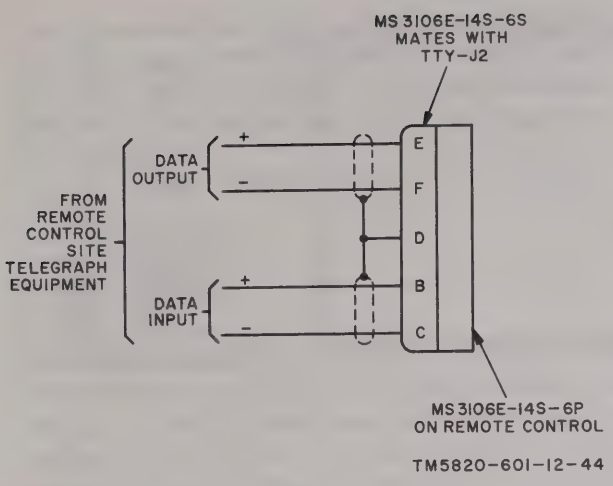

Figure 2–16. Remote control, control data plug wiring.

facilities. Perform the following procedure to connect the two pairs of control data lines:

(1) Route two pairs of control data lines to the remote control. Refer to station drawings for routing and wire size requirements. Terminate wires in a type MS3106E–14S–6S connector at remote control end.

(2) Assign and tag each wire pair with termination designator (positive and negative in and positive and negative out).

(3) Refer to figure 2–16. Make connections to the control data loop wires as specified in (*a*) through (*d*) below.

(*a*) Connect the receiver loop (data input) positive in conductor to plug pin B.

(*b*) Connect the receive loop negative in conductor to plug pin C.

(*c*) Connect the send loop (data output) positive out conductor to plug pin E.

(*d*) Connect the send loop negative out conductor to plug pin F.

(*e*) Assemble plug and terminate shields as shown.

(*f*) Refer to figure 2–17. Insert the control data plug into the control data receptacle, TTY J2. Tighten the plugs knurled locking ring to secure the plug to the receptacle.

e. Primary Power Connection. To connect the 115/230 vac primary power to the remote control proceed as follows:

Warning: **Disconnect and tag existing station power distribution panel circuit breaker used for 115/230 vac primary power source. Serious injury or death may result from contact with these wires.**

(1) Route three no. 16 AWG wires from the station distribution panel to the remote control. Refer to station drawings for routing requirements.

(2) Refer to figure 2–18 and make connections to the plug assembly as follows:

(*a*) Connect the main ac conductor to plug pins A and C.

(*b*) Connect the ground conductor to plug pin B and assemble the plug as shown in figure 2–18.

(3) Determine from station maintenance personnel, station records or through measurement the voltage level being provided for powering the remote control.

(4) Refer to figure 2–17 and set the VOLTAGE SELECT 115 VAC/230 VAC switch to either 115 VAC or 230 VAC, as determined in (3) above.

(5) Insert the ac power plug into receptacle, FL1J1 (fig. 2–17): tighten the plug's knurled locking ring to secure the plug in the receptacle.

(6) Prior to power turn on, check for one amp rating for fuses F1 and F2 (fig. 3–5) and F3 and F4 (fig. 2–17).

2–12. Station Interface Cabling

Station interface cabling consists of connecting station audio lines, full duplex control data lines, 1 MHz standard and antenna feed-in lines to the electrical equipment cabinet. The specially provided opening in the cabinet base is recommended for cable entry.

a. Audio Lines. Eight shielded pairs of audio lines must be connected from the station audio distribution frame to the data distribution panel 1A1A2. Four pair each from the main and diversity terminals. Perform the following procedure to install the audio lines:

(1) Route four pairs of audio lines from the main station audio distribution frame to the electrical equipment cabinet. Refer to station drawings for routing requirements.

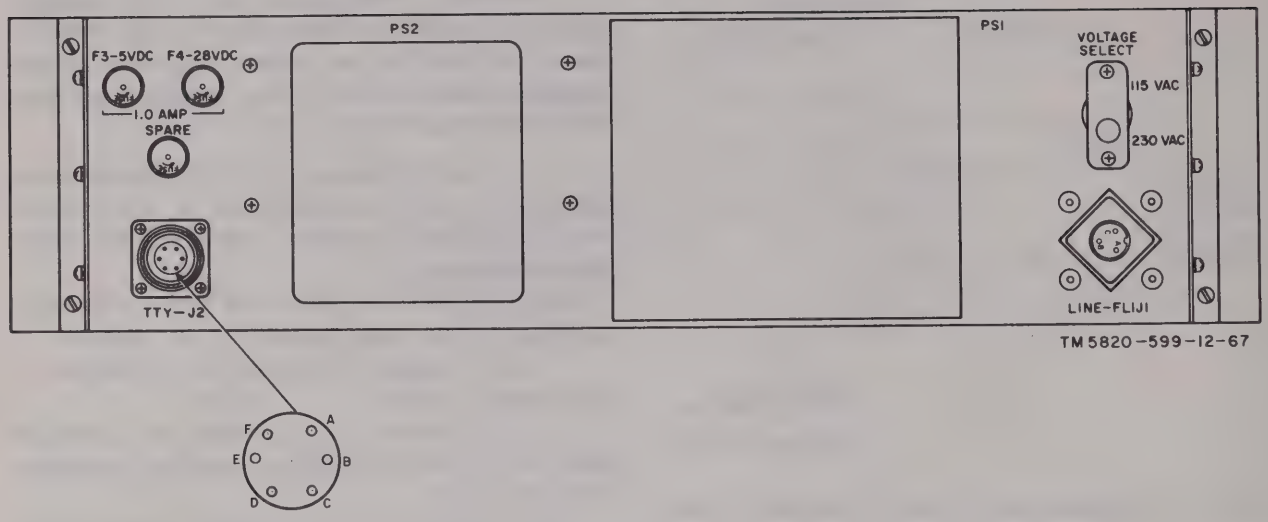

Figure 2–17. Remote control, rear view.

(2) Assign and tag each wire pair with channel termination designator (A1, B1, A2 or B2).

(3) Route the four pair of audio lines through the opening in the base of the electrical equipment cabinet.

(4) Connect the four pair of audio lines to data distribution panel 1A1A2 terminal board TB2 (fig. 2–19) as follows. An adjacent terminal has been provided for making a shield ground connection.

Audio channel	*Terminal Board TB2 main receiver terminals*	*Shield terminals*
A1	1 and 2	3
A2	7 and 8	9
B1	4 and 5	6
B2	10 and 11	12

(5) Route four pairs of audio lines from the diversity terminals on the station audio distribution frame to the electrical equipment cabinet. Refer to station drawings for routing requirements.

(6) Assign and tag each wire pair with channel termination designator (A1, B1, A2, or B2).

(7) Route the four pair of audio lines through the opening in the base of the electrical equipment cabinet.

(8) Connect the four pair of audio lines to data distribution panel 1A1A2 terminal board TB3 (fig. 2–19) as follows. An adjacent terminal has been provided for making a shield ground connection:

Audio channel	*Terminal board TB3 diversity receiver terminal*	*Shield terminals*
A1	1 and 2	3
A2	7 and 8	9
B1	4 and 5	6
B2	10 and 11	12

b. Data Lines. Two pairs of control data lines must be connected between the station dc distribution frame and the data distribution panel. One pair (positive and negative data in) provide data input to the receiver group from the full duplex control data facilities. The other pair (positive and negative data out) provide data output from the receiver group to the control data facilities. Perform the following procedure to install the two pairs of control data lines:

(1) Route two pairs of control data lines to the electrical equipment cabinet. Refer to station drawings for routing and wire size requirements.

(2) Assign and tag each wire pair with termination designator (positive and negative data in) (positive and negative data out).

(3) Route the two pairs of control data lines through opening in cabinet base (optional) to the data distribution panel.

(4) Connect the two pair of control data lines to data distribution panel terminal board TB1 (fig. 2–8) as follows. A common terminal has been provided for making a shield ground connection.

Control data line	*Terminal board TB1 terminal*	*Shield terminals*
+ DATA IN	9	11
− DATA IN	10	11
+ DATA OUT	12	11
− DATA OUT	13	11

c. Main and Diversity Antenna Cables. Two coaxial cables must be connected between the station antenna patch panel and the data distribution panel for the main and diversity antenna inputs. These connections are made at connectors A1J1 (main) and A2J1 (diversity) using standard type N connectors. Refer to figure 2–20 for fabrication data.

d. 1MHz Frequency Standard Cable. A coaxial cable must be connected between the station 1 MHz standard and the RF distribution panel connector J1. Refer to figure 2–21 for fabrication data.

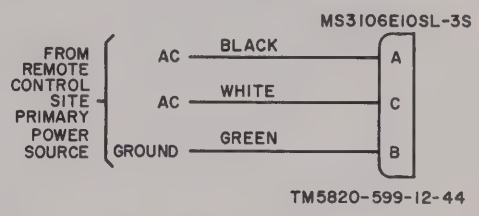

Figure 2–18. Remote control, ac power plug wiring.

Section II. INITIAL ADJUSTMENT OF EQUIPMENT

2–13. Extent of Initial Adjustment

Initial adjustments are not required on the receiving set. Before the receiving set can be used for routine operation, the procedures indicated in table below must be performed. To use the table perform the item given in the item column in the order indicated in the sequence column. Refer to *Procedure* column for specific instructions and to *Reference* column for reference to other sections of the manual.

Sequence No.	*Item*	*Procedure*	*Reference*
	Local Operation:		
1	Preliminary starting	Perform preliminary starting procedure	Paragraph 3–10
2	Starting	Perform starting procedures	Paragraph 3–11
3	Operation	Perform local operating procedures	Paragraph 3–12
4	Standby or stopping operation	Perform local or stopping procedures	Paragraph 16*a*
	Remote Operation:		
5	Preliminary remote starting	Perform preliminary starting procedure	Paragraph 3–10
6	Starting	Perform starting procedures	Paragraph 3–13
7	Operation	Perform remote operating procedures	Paragraph 3–13
8	Standby or stopping operation	Perform remote standby or stopping procedures.	Paragraph 3–16*b*

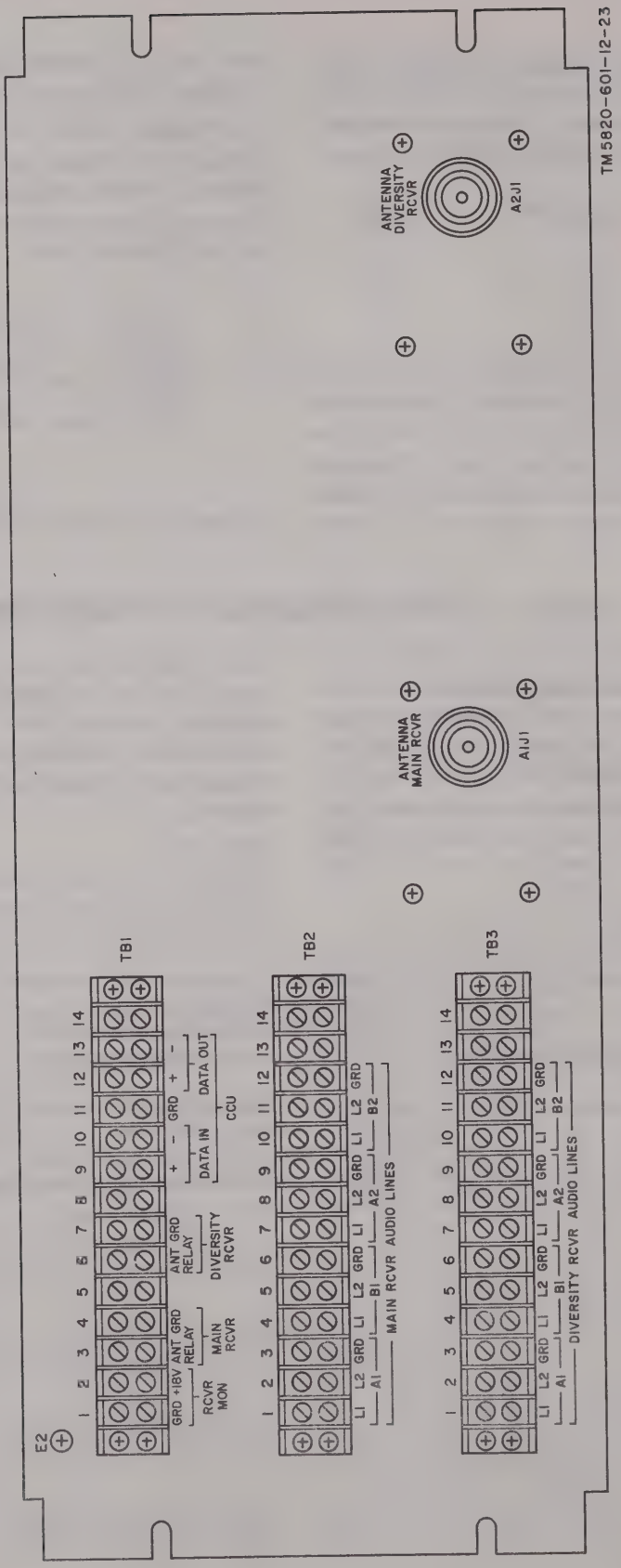

Figure 2–19. Data distribution panel.

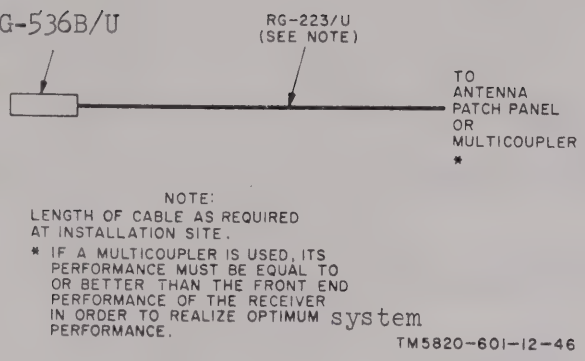

Figure 2-20. Main and diversity antenna cable assemblies.

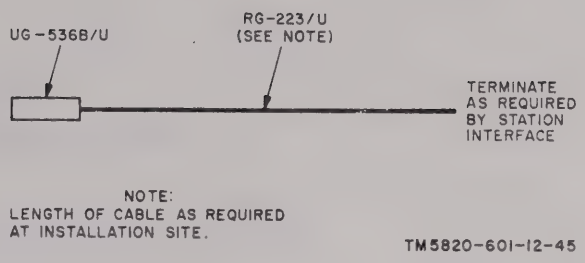

Figure 2-21. 1 MHz external standard cable assembly.

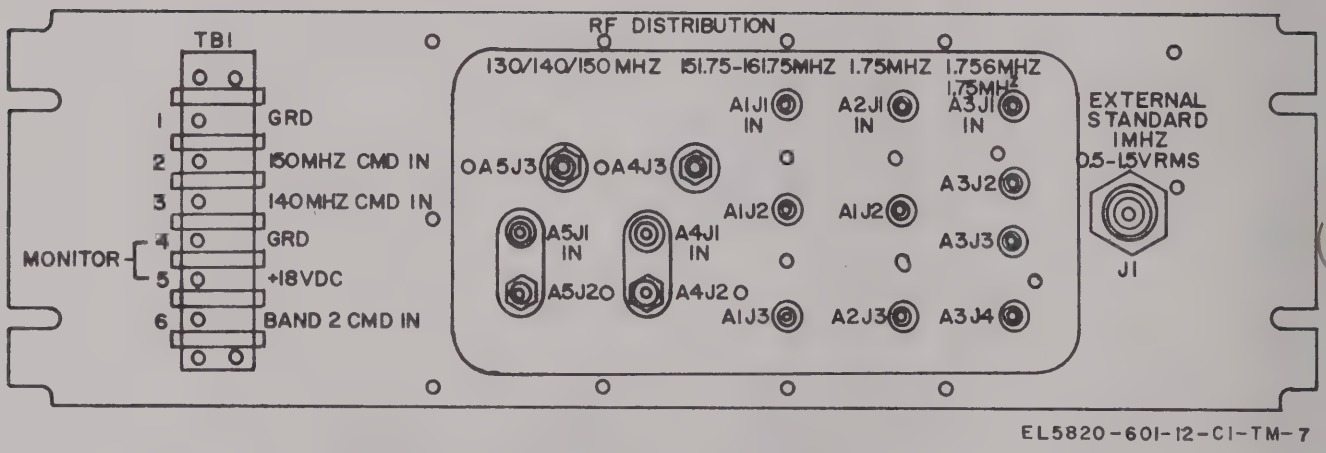

Figure 2-22. Rf distribution panel, connector identification.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. OPERATOR'S CONTROLS AND INDICATORS

Note. This section covers only controls and indicators used by the operator. Controls used by maintenance personnel are covered in instructions for the appropriate category of maintenance.

3–1. Receiving Set, Radio AN/FRR–79, Controls and Indicators

Paragraphs 3–2 through 3–8 describe the front panel controls and indicators used by the operator. In the local mode of operation, the receiving set is operated at the receiver group from the front panel of the synthesizer, main receiver, automatic frequency control, and audio monitor. Several functions of the diversity receiver are controlled from the main receiver, such as remote-local control and channel operating mode selection; therefore, the corresponding switches on the diversity receiver are not accessible and are not used during normal operating conditions.

Note. Pushbutton switches and indicators on the front panels can be identified as follows: the edges of the indicators are grey and match the color of the front panel. The pushbutton switch edges are black.

3–2. Synthesizer Controls and Indicators

The synthesizer controls and indicators are listed in the chart below.

Note. The green CIRCUIT TEST switch positions indicate that respective readings must be within the green portion of the CIRCUIT TEST meter scale.

Control or indicator	*Function*
LAMP TEST switch	When operated, causes all front panel indicator lamps to light.
CIRCUIT TEST meter	Provides go no-go indication in green area or metered level for each switch position of CIRCUIT TEST switch.
CIRCUIT TEST switch	Connects CIRCUIT TEST meter to any one of 23 internal test points in synthesizer. For each following switch position, a meter indication at a specific value or in green area signifies that circuit or signal under test is proper.

Sw pos	*Causes meter to read*
OFF	Meter disconnected.
BAT	+ 18 volts supplied from audio monitor.
+ 18V	+ 18 volts supplied by internal synthesizer power supply 1A2A21.
− 9V	− 9 volts supplied by internal synthesizer power supply 1A2A21.
STD	Output level of 1-MHz standard.
2.3 MHz	2.3-MHz output level of fixed frequency generator 1A2A7.
23 MHz	23-MHz output level of fixed frequency generator 1A2A7.
0.1 KHzΔ	Output level of frequency mixer and divider 1A2A6.
1 KHzΔ	Output level of frequency mixer and divider 1A2A5.
10 KHzΔ	Output level of frequency mixer and divider 1A2A4.

Control or indicator	*Function*
	Sw pos — *Causes meter to read*
	22 MHz — 22-MHz output level of fixed frequency generator 1A2A7.
	4.75 MHz — Output level of 4.75-MHz signal from fixed frequency generator 1A2A7.
	100 KHzΔ — Output level of 100-KHz interpolation frequency mixer 1A2A2.
	CONV-VHF — Output level of frequency converter 1A2A2.
	1 MHzΔ — Output level of 1-MHz interpolation frequency mixer 1A2A1.
	10 MHzΔ — Output level of 10-MHz signal from frequency multiplier 1A2A18.
	BAND INFO — Indicates band relay is energized.
	OUTPUT — Measures VFO (151.75-161.75 MHz) output level.
	1.75 MHz — Output level of 1.75-MHz generator 1A2A20.
	2.9 MHz — Output level of 2.9-MHz signal from fixed frequency generator 1A2A7.
	1.74371 MHz — Output level of 1.74371-MHz signal from offset carrier generator 1A2A14.
	1.75629 MHz — Output level of 1.75629-MHz signal from offset carrier generator 1A2A14.
	CAL — Calibration of CIRCUIT TEST meters.
KHz selector switches (six)	Select receiving set operating frequency during local mode only.
FREQUENCY KHz digital readout indicators (white)	Displays six numerals which represent receiving set frequency.
STANDARD INTERNAL-EXTERNAL indicator switch (green/yellow).	Selects internal or external frequency standard and provides visual indication of selection.
FAULT indicator (red)	Lights to indicate internal fault in synthesizer.
CIRCUIT BREAKER	Applies primary power and provides overload protection when in RESET position. Removes primary power when in TRIPPED (or off) position.

3-3. R-1543/FRR-79 Controls and Indicators (fig. 3-2)

The controls and indicators applicable to both the main and diversity receivers are listed in the chart below.

Notes.

1. The reference designations listed in the chart are for the main receiver (1A3); however, the data provided also applies to the diversity receiver (1A4).

2. The green CIRCUIT TEST switch positions indicate that their respective readings must be within the green portion of the CIRCUIT TEST meter scale.

3. In addition to the controls and indicators listed, there are controls located at the top of the receiver. These controls are set prior to equipment shipment, but may require adjustment due to changing of operating conditions or aging of components. Higher category maintenance personnel will perform these adjustments.

Control or indicator	*Function*
LAMP TEST switch	When operated, causes all front panel indicator lamps to light.
CIRCUIT TEST meter	Provides go no-go indication in green area or a metered level for each switch position of CIRCUIT TEST switch.

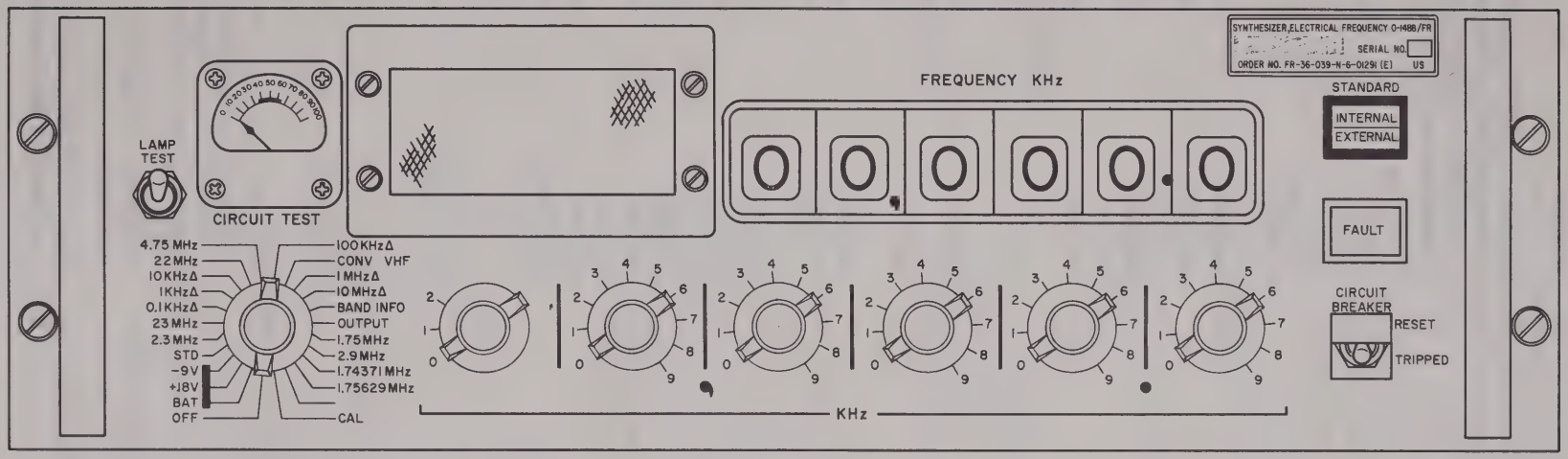

Figure 3–1. Synthesizer, controls and indicator.

Control or indicator	*Function*
CIRCUIT TEST switch	Connects CIRCUIT TEST meter to internal test points in R-1534/FRR-79. For each following switch position, a meter indication at a specific value or an indication in green areas signifies that circuit or signal under test is normal.

Sw pos	*Causes meter to read*
OFF	Meter dsconnected.
+ 18V	+ 18-volt output from receiver power supply 1A3A15.
− 18V	− 18-volt output from receiver power supply 1A3A15.
IF HYB	Current drawn by IF hybrid A3.
RF HF	Current drawn by amplifier in HF mixer 1A3A20.
RF VHF	Current drawn by VHF mixer 1A3A16.
RF VFO	Signal level of detected 151.75- to 161.75-MHz signal.
RF LO	Signal level of detected 130-, 140-, or 150-MHz signal.
RF AGC	Level of agc voltage in HF gain equalizer 1A3A21.
B2 IF	9-volt reference point in IF amplifier 1A3A10.
B2 AGC	Agc voltage of IF amplifier 1A3A10.
B1 IF	9-volt reference point of IF amplifier of 1A3A12.
B1 AGC	Agc voltage of IF amplifier 1A3A12.
A1 IF	9-volt reference of IF amplifier 1A3A9.
A1 AGC	AGC voltage of IF amplifier 1A3A9.
A2 IF	9-volt reference of IF amplifier 1A3A11.
A2 AGC	Age voltage of IF amplifier 1A3A11.
ANT BAND	Band information for bands, 1, 2, and 3. Meter reading is approximately 10 for band 1, 20 for band 2, and 30 for band 3.
LO BAND	Band information for bands A, B, and C. Meter reading is approximately 10 for band A, 20 for band B, and 30 for band C.
DISC SW	Indicates operation of discriminator relay during tune cycle.

LOCAL-REMOTE CONTROL switch	In LOCAL position, places control of receiving set operation at front panels of electrical equipment cabinet. In REMOTE position, local controls are disabled and receiving set is operated from the remote control.
OPERATING MODE indicators (four) (green)	Provide visual display of selected operating channel agc time constants.
OPERATING MODE selector switches (four)	Select one of three available time constants for VOICE, VFCT, or DATA. Fourth position is vacant for system expansion.

Control or indicator	*Function*
NON-NORM/FAULT indicator (yellow/red)	NON-NORM lamp lights when R–1543/FRR–79 is not fully set for remote operation. FAULT lamp lights when R–1543/FRR–79 failure occurs.
TUNE indicator switch (yellow)	Disables automatic frequency control circuits (if activated) and reinitiates receiver pre-selector tuning cycle. The need to press the TUNE switch will normally arise when the frequency selection operation exceeds 20 seconds, which lights the FAULT and TUNE indicator light momentarily, the lamp will extinguish when the tune cycle is completed and the receiver will be tuned to the selected frequency. A momentary flashing of the TUNE lamp during a frequency change is a normal condition. If the TUNE and FAULT lamps remain on after approximately 10 seconds, a tuning fault has occurred. The TUNE switch should be pressed once again. If the fault remains, corrective action is required.
CIRCUIT BREAKER	Applies primary power and provides overload protection when in RESET position. In TRIPPED position, removes primary power.

3–4. Automatic Frequency Control, Controls and Indicators
(fig. 3–3)

The controls and indicators for the automatic frequency control are listed in the chart below.

NOTE

The green CIRCUIT TEST switch positions indicate that respective readings must be within the green portion of the CIRCUIT TEST meter scale.

Control or indicator	*Function*
LAMP TEST switch	When operated, causes all front panel indicator lamps to light.
CIRCUIT TEST Meter	Provides go no-go indication in the green area or metered level for each switch position of CIRCUIT TEST switch.
CIRCUIT TEST switch	Connects CIRCUIT TEST meter to internal test points in automatic frequency control. Unless otherwise noted, meter indication as a specific value, or indication in green area, for each switch position signifies that signal or circuit under test is normal.

Sw pos	*Causes meter to read*
OFF	Meter disconnected.
CARRIER	Detected carrier signal in loop phase detector 1A5A39.
OVEN	Current drawn by oven in variable RF oscillator 1A5A31.
1MHz PH DET	Output of phase detector in automatic calibration unit 1A5A2.
VCO BIAS	Bias voltage on varicap in variable RF oscillator 1A5A31.
LOCAL DET	Carrier signal in signal detector 1A5A38.
LOCAL OCS	Output of 1.75-MHz local oscillator in signal detector 1A538.
IF AMPL	Current drawn by IF carrier amplifier 1A5A13.
1 MHz	1-MHz signal in automatic calibration unit 1A5A2.

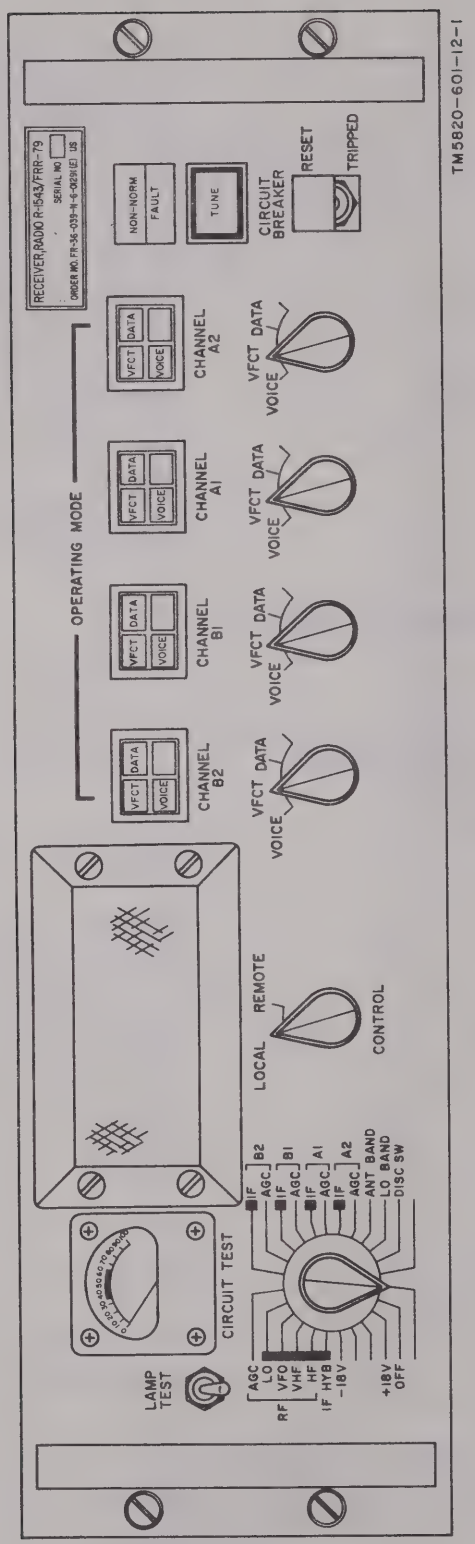

Figure 3-2. R-1543/FRR-79, typical, controls and indicators.

Control or indicator	*Function*	
	Sw pos	*Causes meter to read*
	21 MHz	21-MHz signal in automatic calibration unit 1A5A2.
	22 MHz	22-MHz signal in automatic calibration unit 1A5A2.
	1.75 MHz	1.75-MHz reference signal in loop phase detector 1A5A39.
	−18 V	−18-volt output of automatic frequency control power supply 1A5A10.
	+18 V	+18-volt output of automatic frequency control power supply 1A5A10.
	+18 V STANDBY	+18-volts supplied to afc oven.
	SERVO-DRIVER	Voltage on servo motor in servo assembly 1A5A4.
	DET RELAY	Phase lock of local oscillator to incoming signal. 0 reading indicates phase lock is accomplished. Center reading indicates phase lock is not accomplished.
	RESET RELAY	0 when 22-MHz variable RF oscillator in automatic calibration unit is reset by 1-MHz reference signal from synthesizer.
	TIMER RELAY	Time delay for resetting variable RF oscillator 1A5A31. Meter reading in green area occurs during reset time delay only.
	MEMORY RELAY	Position of servo assembly. 0 reading indicates servo is disconnected, any meter deflection indicates that servo is connected.
FINE TUNE switch (yellow)	Enables FINE TUNE control on front panel of automatic frequency control. Overrides afc if afc on is selected.	
FINE TUNE control	When enabled by FINE TUNE switch, can be used to manually fine tune MAIN receiver to an incoming signal ±1 KHz (nominal) about frequency selected at synthesizer.	
AFC ON-CARR FAIL indicator switch (green/yellow).	When pressed during local operation, activates automatic frequency control circuits; AFC ON lamp lights to indicate automatic frequency control is selected; CARR FAIL lamp lights when carrier fades, or drifts in frequency outside capture range of afc circuit.	
MAIN-DIVERSITY indicator switch (green/green).	Selects 1.75-MHz received carrier from main or diversity receiver for use in automatic frequency control.	
FAULT indicator (red)	Indicates a malfunction in AFC power supply.	
CIRCUIT BREAKER	Protects against power supply overload.	

3–5. Audio Monitor Controls and Indicators (fig. 3–4)

The controls and indicators for the audio monitor are listed in the chart below.

Note. The green CIRCUIT TEST switch positions indicate that their respective readings must be within the green portion of the CIRCUIT TEST meter scale.

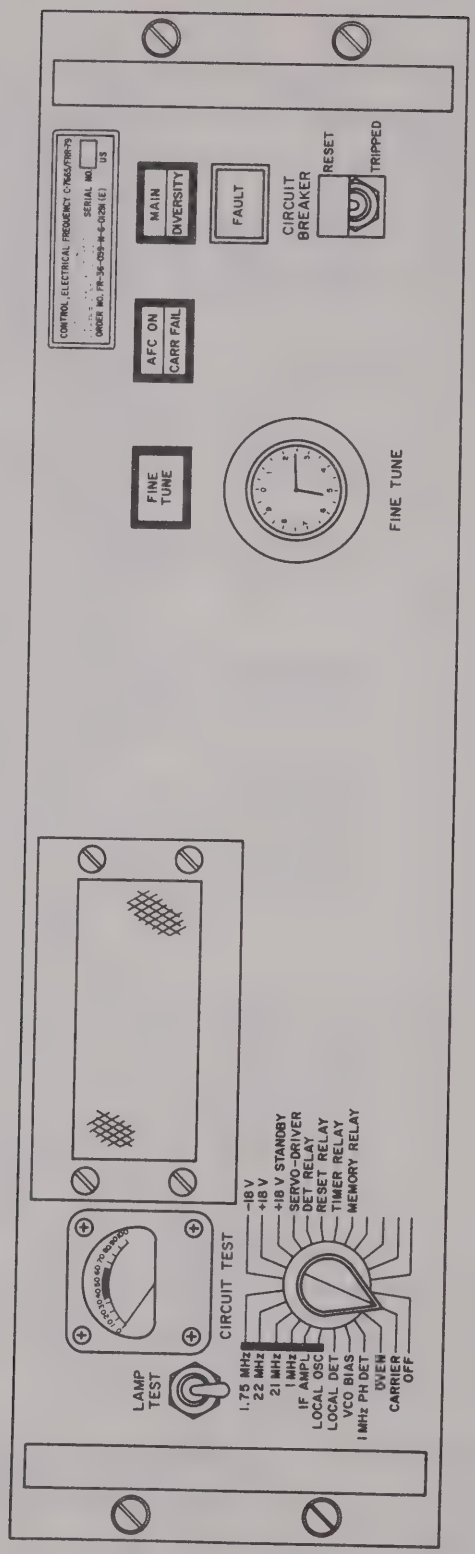

Figure 3-3. Automatic frequency control, controls and indicators.

Control or indicator	*Function*
LAMP TEST switch	When pressed, causes all panel indicator lamps to light.
CIRCUIT TEST meter	Provides go no-go indication in green area, or a metered level for each position of CIRCUIT TEST switch.
CIRCUIT TEST switch	Connects CIRCUIT TEST meter to any one of 16 internal test points in audio monitor. For each following switch position, a meter indication at a specific value, or a reading in green area, signifies that circuit or signal under test is proper.
	Sw pos — *Causes meter to read*
	AFF — Meter disconnected.
	+18V — Output voltage of +18-volt auxiliary power supply and battery charger 1A6A10.
	BAT VOLT — Battery volt of a reading in green area indicates normal operating voltage range of battery.
	BAT CHARGE — Battery charger output current.
	BAT DISCH — Battery current drain.
	OVEN AFC — Automatic frequency control oven current in standby mode.
	OVEN SYNTH — Synthesizer oven current (standby mode and emergency power failure).
	MON AMPL — Current drain of amplifier 1A6A11.
	MAIN RCVR LINE AMPL A2. — 9-volt supply in main receiver channel A2 line amplifier.
	MAIN RCVR LINE AMPL A1. — 9-volt supply in main receiver channel A1 line amplifier.
	MAIN RCVR LINE AMPL B1. — 9-volt supply in main receiver channel B1 line amplifier.
	MAIN RCVR LINE AMPL B2. — 9-volt supply in main receiver channel B2 line amplifier.
	DIVERSITY RCVR LINE AMPL B2. — 9-volt supply in diversity receiver channel B2 line amplifier.
	DIVERSITY RCVR LINE AMPL B1. — 9-volt supply in diversity receiver channel B1 line amplifier.
	DIVERSITY RCVR LINE AMPL A1. — 9-volt supply in diversity receiver channel A1 line amplifier.
	DIVERSITY RCVR LINE AMPL A2. — 9-volt supply in diversity receiver channel A2 line amplifier.
	CCU HOLDING — Current drain of control converter memory circuits.
FAULT indicator (red)	Lights to indicate loss of ac or +18-volt power in audio monitor, simultaneous failure of battery charger and battery or tripped CIRCUIT BREAKER.
MONITOR CHANNEL MAIN-DIVERSITY switch	Selects any one of eight audio channels for visual display on vu meter, and for aural monitoring at MONITOR OUTPUT 600Ω jack or front panel speaker (main receiver channels A1, A2, B1, and B2; or diversity receiver channels A1, A2, B1, and B2).
Vu meter	Monitors audio output level of any of the eight channels selected by MONITOR CHANNEL MAIN-DIVERSITY switch.
BATTERY BREAKER PUSH TO RESET switch	Opens battery circuit when overload condition occurs, or when button is pulled.
VU RANGE switch	Selects range of vu meter.
VOLUME control	Controls volume at front panel speaker, and audio level at MONITOR OUTPUT 600Ω jack.
OPERATOR-STANDBY indicator switch (green/yellow).	Alternate-action indicator switch that selects standby or operate condition for receiver group in local mode. In STANDBY position, operating power is removed from all major components of receiver group, except critical control

Control or indicator	*Function*
	circuits in audio monitor and control converter. Standby power is applied to crystal oven in automatic frequency control and synthesizer, and to memory circuit in control converter. In OPERATE position, power is applied to all components of receiver group.
CIRCUIT BREAKER	Protects against power supply overload. Switch has protective cover to prevent inadvertent operation while receiving set is activated. Placing CIRCUIT BREAKER at TRIPPED during standby condition removes primary power from the audio monitor and applies power to all major components of the receiver group except for the control converter.
MONITOR OUTPUT 600Ω jack	Enables monitoring of audio by a headset from front panel of audio monitor of any line selected by use of MONITOR CHANNEL MAIN-DIVERSITY switch.

3–6. Remote Control, Controls and Indicators
(fig. 3–5)

The controls and indicators for the remote control are listed in the chart below.

NOTE

The seven FUNCTION SET pushbutton switches are the locking type and are mechanically interlocked so that only one may be pressed at a time. Pressing a FUNCTION SET pushbutton switch locks it in its depressed position, and releases other FUNCTION SET pushbutton switches previously pressed.

Control or indicator	*Function*
POWER ON-OFF switch	Controls operating power to remote control.
POWER indicator (green)	Lights when POWER ON-OFF switch is set to ON to indicate that operating power is applied to remote control.
CONTROL OVERRIDE indicator (yellow)	Lights when main receiver LOCAL-REMOTE switch is set to LOCAL to indicate that local control mode is selected at main receiver.
CONTROL AVAIL indicator (green)	Lights when LOCAL-REMOTE switch is set to REMOTE to indicate that remote control mode is selected at MAIN receiver.
READY-FREQ indicator:	
READY (green)	Lights to indicate that tuning is complete, and receiving set is ready to handle traffic.
FREQ (green)	Lights to indicate execution of remote control frequency change command to frequency displayed on six FREQ KHz thumbwheel switches. Changing setting of any FREQ KHz thumbwheel switch turns off RED indicator.
COMMAND INITIATE pushbutton switch (momentary contact).	When momentarily pressed, initiates execution of a single selected remote control command determined by remote control front panel switch settings.
FUNCTION SET FREQ pushbutton switch	When locked in depressed position, selects a frequency change command to new frequency determined by setting of six FREQ KHz thumbwheel switches. COMMAND INITIATE pushbutton switch must be momentarily pressed to execute command.

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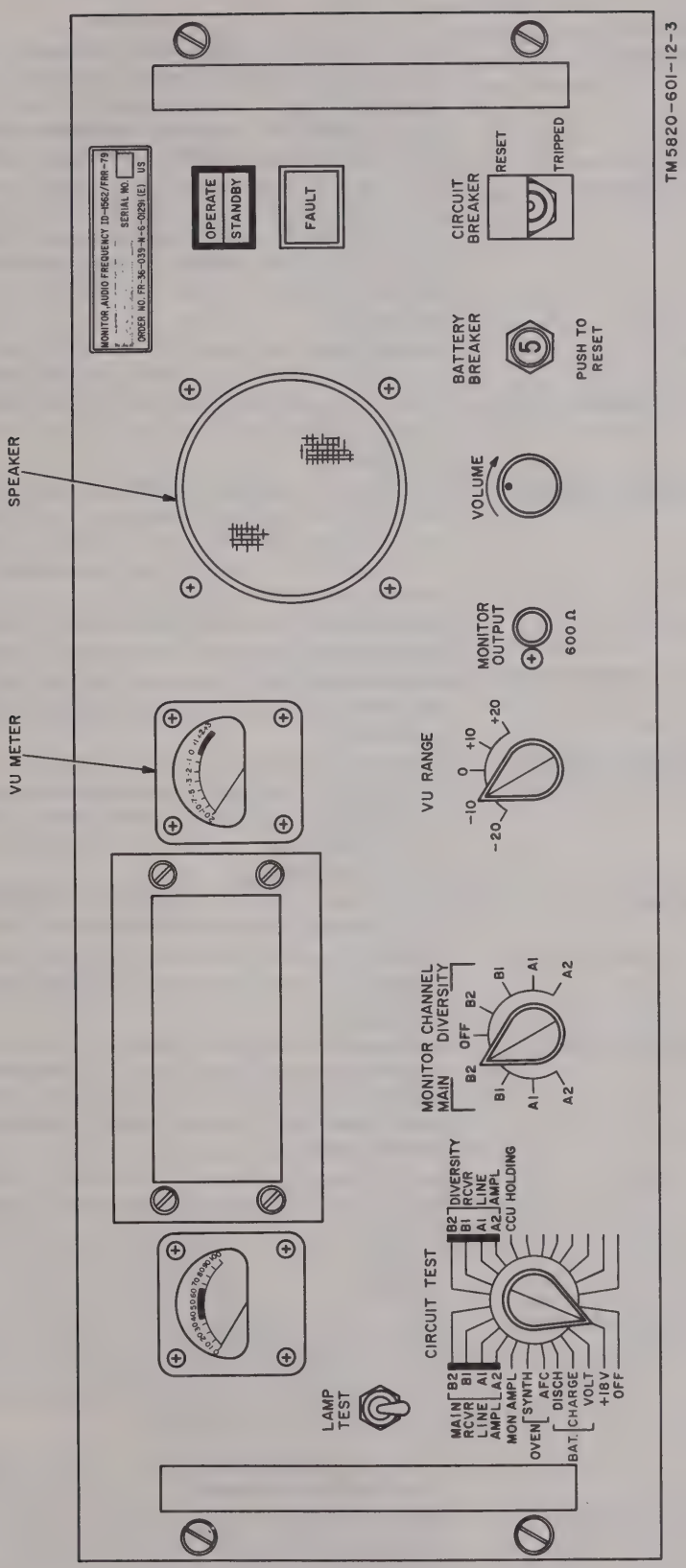

Figure 3-4. Audio monitor, controls and indicators.

Control or indicator	*Function*
FREQ KHz thumbwheel switches (six)	Provides means to enter desired frequency into remote control. Each thumbwheel switch represents one of six decimal frequency digits. The frequency is read in KHz directly from the switches. Maximum selectable frequency is 29999.9 KHz; minimum selectable frequency is 2,000.0 KHz.
FUNCTION SET CHAN B2 pushbutton switch	When locked in depressed position, selects one of three channel B2 agc time constant commands, as determined by setting of CHAN B2 VO-VFCT-DATA switch. COMMAND INITIATE pushbutton switch must be momentarily pressed to execute command. (A spare position is provided for future expansion.)
CHAN B2 VO-VFCT-DATA switch	Provides means to enter a VO, VFCT, or DATA agc time constant command for channel B2 into remote control.
AGC TIME CONSTANTS B2 VO-VFCT-DATA indicator (white).	VO, VFCT, or DATA indicator lights to indicate that the last channel B2 agc time constant remote control command is executed.
FUNCTION SET CHAN B1 pushbutton switch	When locked in depressed position, selects one of three channel B1 agc time constant commands, as determined by setting of CHAN B1 VO-VFCT-DATA switch. COMMAND INITIATE pushbutton switch must be momentarily pressed to execute command.
CHAN B1 VO-VFCT-DATA rotary switch	Provides means to enter a VO (voice), VFCT, or DATA agc time constant command for channel B1 into remote control.
AGC TIME CONSTANTS B1 VO-VFCT-DATA indicator (white).	VO, VFCT, or DATA indicator lights to indicate that the last channel B1 agc time constant remote control command is executed.
FUNCTION SET CHAN A1 pushbutton switch	When locked in depressed position, selects one of three channel A1 agc time constant commands, as determined by setting of CHAN A1 VO-VFCT-DATA switch. COMMAND INITIATE pushbutton switch must be momentarily pressed to execute command.
CHAN A1 VO-VFCT-DATA switch	Provides means to enter a VO (voice), VFCT, or DATA agc time constant command for channel A1 into remote control.
AGC TIME CONSTANTS A1 VO-VFCT-DATA indicator (white).	VO, VFCT, or DATA indicator lights to indicate that the last channel A1 agc time constant remote control command is executed.
FUNCTION SET CHAN A2 pushbutton switch	When locked in depressed position, selects one of three channel A2 time constant commands, as determined by setting of CHAN A2 VO-VFCT-DATA switch. COMMAND INITIATE pushbutton switch must be momentarily pressed to execute command.
CHAN A2 VO-VFCT DATA switch	Provides means to enter a VO (voice), VFCT, or DATA agc time constant command for channel A2 into remote control.
AGC TIME CONSTANTS A2 VO-VFCT-DATA indicator (white).	VO, VFCT, or DATA indicator lights to indicate that the last channel A2 agc time constant remote control command is executed.
FUNCTION SET RCVR pushbutton switch	When locked in depressed position, selects either a R-1543/FRR-79 operate or a R-1543/FRR-79 standby command, as determined by RCVR OPR-STBY switch setting. COMMAND INITIATE pushbutton switch must be momentarily pressed to execute command.
RCVR OPR-STBY switch	Provides means to enter either R-1543/FRR-79 operate or R-1543/FRR-79 standby command into remote control.
RCVR OPR-STBY indicator (green/yellow)	Either RCVR OPR or RCVR STBY indicator lights to indicate whether receiving set was set to operate mode or standby mode, respectively, by last remote control command executed.

Control or indicator	*Function*
FUNCTION SET AFC pushbutton switch	When locked in depressed position, selects either afc-on or afc-off command, as determined by setting of AFC ON-OFF switch. COMMAND INITIATE pushbutton switch must be momentarily pressed to execute command.
AFC ON-OFF switch	Provides means to enter either afc-on or afc-off command into command into remote control.
AFC ON-OFF indicator (green/yellow)	Either AFC ON indicator or AFC OFF indicator lights to indicate whether afc was set to on or off, respectively, by last afc remote control command executed.
FAULT COMMAND indicator (red)	Lights to indicate incorrect response to remote control command initiated at remote control (15-second delay).
FAULT RCVR indicator (red)	Lights to indicate that summary fault condition has occurred in receiving set.
FAULT LINK indicator (red)	Lights to indicate that fault exists in either or both of telegraph loops interconnecting remote control and control converter.
LINK FAULT TEST pushbutton switch (momentary contact).	Provides means to clear a link fault condition registered in remote control and control converter *if* their interconnecting telegraph loops are both in operating condition.

3–7. Control Converter, Controls and Indicators
(fig. 3–6)

The controls and indicators for the control converter are listed in the chart below.

Control or indicator	*Function*
POWER 5VDC-28VDC indicator (green/green)	Lights when power is applied to 5- and 28-volt power supplies in remote control.
FAN fuse indicators (two) (red)	Light to indicate that fuse in blower motor circuit has blown.
Power ON-OFF switch	Controls operating power to remote control.
FAULT LINK indicator (red)	Lights to indicate that fault exists in either or both of telegraph loops interconnecting remote control and control converter. Control converter FAULT LINK indicator can be extinguished by pressing remote control LINK FAULT TEST switch (only if both telegraph loops are in operating condition).

3–8. Power Distribution Panel, Controls and Indicators
(fig. 3–7)

The controls and indicators for the power distribution panel are listed in the chart below.

Control or indicator	*Function*
MAIN POWER ON-OFF switch	Applies 115 or 230 volts ac, 47.5 to 440 Hz to the following components in the electrical equipment cabinet: synthesizer, main and diversity receivers, automatic frequency control, audio monitor, and control converter. The remote control obtains its power from remote position power source and not from power distribution panel.
RECEIVER GROUP MAIN POWER indicator (amber).	Lights when MAIN POWER ON-OFF switch is placed at ON.
MAIN POWER 10 AMP fuse-indicators (amber)	Two 10-ampere fuses and associated indicators, one for each side of ac line. Indicators light when fuse blows, indicating overload condition.
SYNTHESIZER 3 AMP fuse-indicators (amber)	Two 3-ampere fuses and associated indicators, one for each side of line, that supply primary power to synthesizer.
MAIN RECEIVER 3 AMP fuse-indicators (amber)	Two 3-ampere fuses and associated indicators, one for each side of ac line, that supply primary power to main receiver.

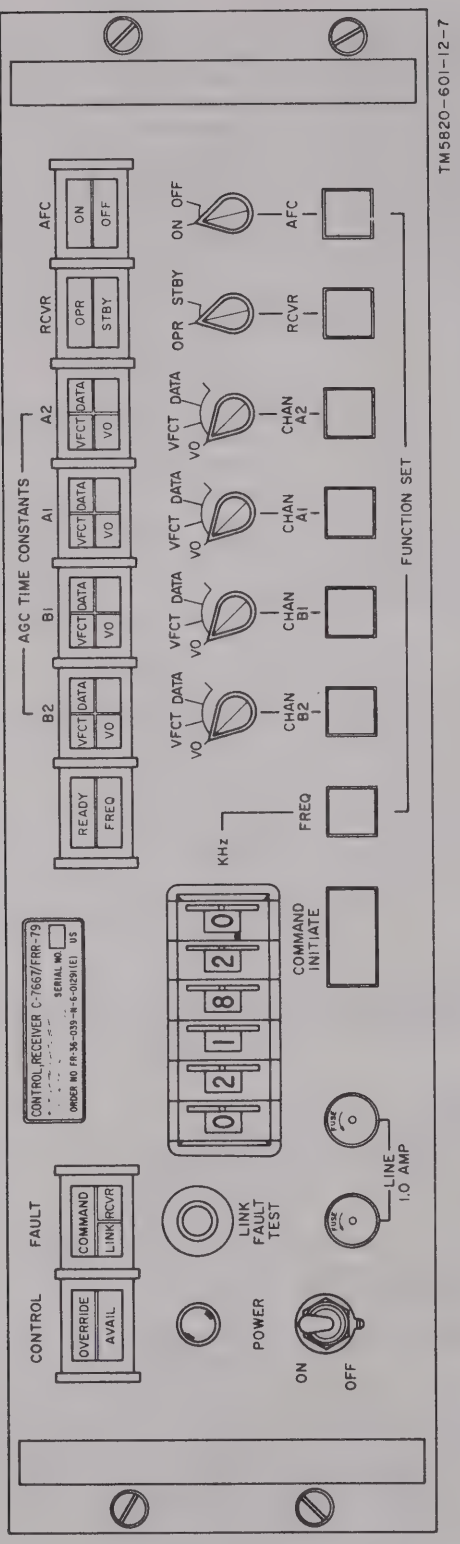

Figure 3–5. Remote control, controls and indicators.

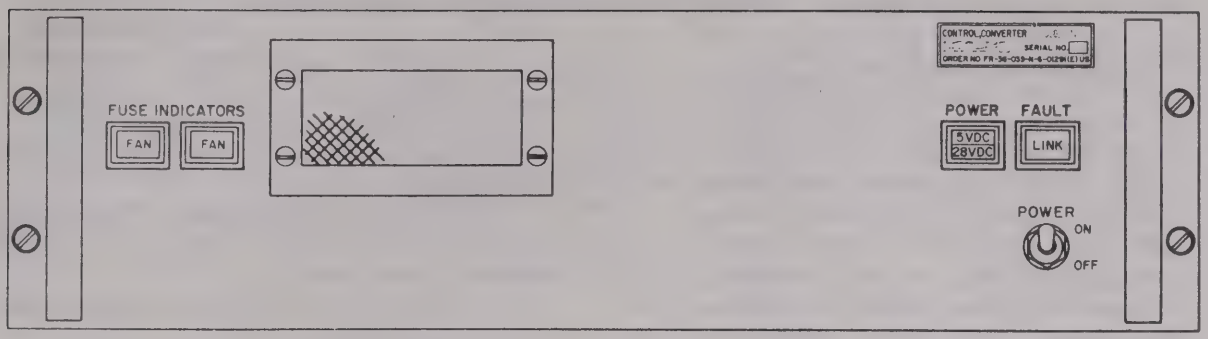

Figure 3-6. Control converter, controls and indicators.

Control or indicator	*Function*
UTILITY 10 AMP fuse-indicators (amber)	Two 10-ampere fuses and associated indicators that supply primary power to UTILITY outlet at front of electrical equipment cabinet.
DIVERSITY RECEIVER 3 AMP fuse-indicators (amber)	Two 3-ampere fuses and associated indicators, one for each side of ac line, that supply primary power to diversity receiver.
MONITOR 3 AMP fuse-indicators (amber)	Two 3-ampere fuses and associated indicators, one for each side of ac line, that supply primary power to audio monitor.
CONTROL CONVERTER 3 AMP fuse-indicators (amber)	Two 3-ampere fuses and associated indicators, one for each side of ac line, that supply primary power to control converter.
AFC 3 AMP fuse-indicators (amber)	Two 3-ampere fuses and associated indicators, one for each side of ac line, that supply primary power to automatic frequency control.

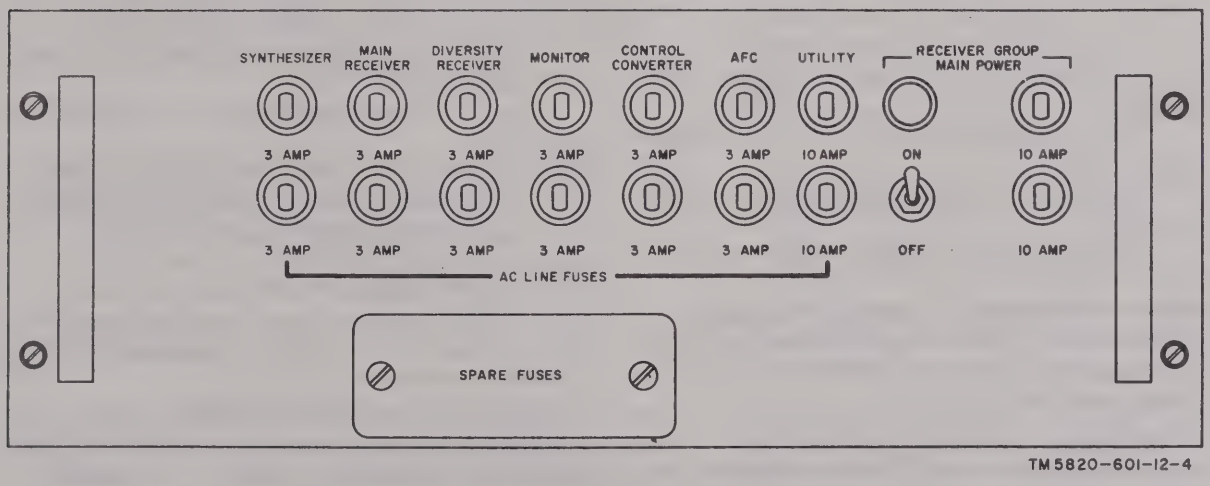

Figure 3-7. Power distribution panel, controls and indicators.

Section II. OPERATION UNDER USUAL CONDITIONS

3-9. Modes of Operation

a. The receiver group can be operated locally (from the front panels of the receiver group at the electrical equipment cabinet) or remotely (front the remote control located away from the electrical equipment cabinet). In either mode, the receiving set can receive voice, multichannel teletypewriter, facsimile, data, or keyed continuous wave. Both the local and remote operators have the capability to tune the equipment, change agc time constants, operate with or without automatic frequency control, monitor fault and status conditions, and energize receiver group components. Only the local operator, however, can manually fine tune the equipment for a drifting carrier, and monitor audio both visually and aurally.

b. To operate the equipment locally, perform the following procedures:

(1) Preliminary starting procedure (para 3-10).

(2) Starting procedure (para 3-11).

(3) Local operating procedure (para 3-12).

(4) Stopping procedure (3-16).

c. To operate the equipment remotely, perform the following procedures:

(1) Preliminary starting procedure (para 3-10).

(2) Starting procedure (para 3-11).

(3) Remote operating procedure (para 3-13).

(4) Changing remote control commands (para 3-14).

(5) Remote fault condition reset (para 3-15).

(6) Stopping procedure (para 3-16).

3-10. Preliminary Starting Procedure

Perform the following preliminary starting procedure at the receiver group electrical equipment cabinet:

Note. Before proceeding, make sure that the power distribution panel MAIN POWER ON-OFF switch (fig. 3-7) is set to OFF.

a. Set the synthesizer (fig. 3-1) switches as follows:

(1) CIRCUIT BREAKER to TRIPPED.

(2) KHz selector switches to 02,000.0.

(3) CIRCUIT TEST switch to OFF.

b. Set the main receiver (fig. 3-2), controls and switches as follows:

(1) CIRCUIT BREAKER to TRIPPED.

(2) OPERATING MODE selector switches to VOICE.

(3) LOCAL-REMOTE CONTROL switch to LOCAL.

(4) CIRCUIT TEST switch to OFF.

c. Set the diversity receiver (fig. 3-2) switches as follows:

(1) Check that front panel control cover is in place.

(2) CIRCUIT BREAKER to TRIPPED.

(3) CIRCUIT TEST switch to OFF.

d. Set the automatic frequency control (fig. 3-3) switches as follows:

(1) CIRCUIT BREAKER to Tripped.

(2) CIRCUIT TEST switch to OFF.

e. Set the audio monitor (fig. 3-4) switches as follows:

(1) CIRCUIT BREAKER to TRIPPED.

(2) BATTERY BREAKER PUSH TO RESET switch pulled out.

(3) VU RANGE switch to 0.

(4) MONITOR CHANNEL MAIN-DIVERSITY switch to off position.

(5) CIRCUIT TEST switch to OFF.

f. Set the control converter (fig. 3-6) POWER switch to OFF.

g. Set the remote control (fig. 3-5) switches as follows:

(1) POWER ON-OFF switch to OFF.

(2) RCVR OPR-STBY switch to STBY.

(3) AFC ON-OFF switch to OFF.

3-11. Starting Procedure

Note. If an abnormal indication is obtained during the starting procedure, refer to paragraph 4-10 for corrective measures.

With the controls set as outlined in the preliminary starting procedure (para 3-10), perform the procedures given in *a* through *f* below.

a. Set the power distribution panel (fig. 3-7) MAIN ON-OFF POWER switch to ON.

The RECEIVER GROUP MAIN POWER indicator should light.

b. Set the audio monitor CIRCUIT BREAKER to RESET. The STANDBY indicator in the OPERATE-STANDBY indicator switch should light. If the OPERATE indicator lights, press the OPERATE-STANDBY indicator switch to STANDBY: the STANDBY indicator should light. Check to see that all FAULT indicators are off.

c. Press the BATTERY BREAKER PUSH TO RESET switch.

d. Set the CIRCUIT BREAKER switches on the synthesizer (fig. 3–1), the main and diversity receivers (fig. 3–2), the automatic frequency control (fig. 3–3), and the control converter (fig. 3–6) to RESET.

e. On the control converter, observe that the FAULT LINK and POWER 5VDC and 28VDC lamps light.

f. Allow the equipment to warm up for 1 hour.

g. Set the audio monitor (fig. 3–4) OPERATE/STANDBY indicator switch to OPERATE. The OPERATE lamp should light. On the main receiver, the NON-NORM lamp and the four OPERATING MODE VOICE channel indicator lamps should also light. On the diversity receiver the four OPERATING MODE VOICE channel indicator lamps should also light.

NOTE

At the initial turn on of power (using the internal frequency standard), the FAULT lamp on the synthesizer may light due to insufficient warmup time for the frequency standard. After approximately 15 minutes, the lamp should extinguish.

h. On the automatic frequency control, if the FINE TUNE indicator switch comes on, press it. Observe that either the MAIN or DIVERSITY indicator switch is on, if the AFC ON indicator switch comes on, press it.

i. If the FAULT indicator lamp lights when at EXTERNAL, place CIRCUIT TEST switch at STD and check for indication of 1 MHz external signal. If the internal frequency standard is desired and the EXTERNAL lamp is lighted, press the INTERNAL/EXTERNAL indicator switch. The INTERNAL lamp should then light.

3–12. Local Operating Procedure

To operate the receiving set locally, start the equipment (para 3–10 and 3–11) and proceed as follows:

a. On the main receiver, select the desired agc time constants by setting the OPERATING MODE selector switches to VCFT or DATA, or leave them in VOICE. The selected mode for each channel will be displayed by the OPERATING MODE indicators on both the main and diversity receivers.

b. On the synthesizer, set the KHz switches to the desired operating frequency. The FREQUENCY KHz readout indicators will display the selected frequency.

NOTE

If the selection of frequency exceeds 20 seconds, the TUNE and FAULT indicators on the main and diversity receivers will come on. Press the TUNE indicator switch to initiate the tuning cycle again. Observe that the TUNE and FAULT indicator lamps go off after approximately 8 seconds.

c. To monitor audio, rotate the MONITOR CHANNEL switch on the audio monitor to the position corresponding to the main receiver or diversity receiver channel to be monitored. Adjust the VOLUME CONTROL and the Vu range for the desired audio level.

d. To monitor audio by use of a headset, insert the male plug of the headset into the MONITOR OUTPUT telephone jack on the audio monitor.

NOTE

The headset and the front panel speaker cannot be used simultaneously. Plugging a headset into the MONITOR OUTPUT jack opens the circuit to the speaker. Conversely, the speaker is energized only when the headset is removed from the MONITOR OUTPUT jack.

e. If it is desirable or necessary to tune the receiving set manually to a frequency between the fixed 100Hz increments available at the synthesizer, proceed as follows:

(1) Set the synthesizer to the nearest 100 Hz increment.

(2) Press the FINE TUNE switch on the automatic frequency control. (This enables the FINE TUNE control.)

(3) Monitor the audio using the audio monitor front panel speaker or a headset as described in steps *d* and *e*.

(4) Vary the FINE TUNE control on the automatic frequency control until the proper au-

dio output is obtained. It may be necessary to occasionally vary the control to compensate for drift of the incoming carrier signal.

f. Activate or deactivate the automatic frequency control as follows:

NOTE

Prior to operating the automatic frequency control, observe that the FINE TUNE indicator switch lamp is off, if not press switch and observe that lamp goes off. Also observe that either the MAIN or DIVERSITY indicator switch lamp is on.

(1) To activate the automatic frequency control, check the AFC ON/CARR FAIL indicator switch on the front panel (fig. 3–3). If the AFC ON lamp is off, press the switch. The AFC ON lamp should light indicating that the automatic frequency control is activated.

(2) If automatic frequency control is *not* desired and the AFC ON lamp came on during the starting procedure, press the switch. The lamp will go off. If the AFC ON lamp remained off during the starting procedure, no further action is required.

3–13. Remote Operating Procedure

NOTE

The two control data loops interconnecting the remote control and the control converter must be in operation to perform any remote control functions.

a. At the receiver group electrical equipment cabinet, perform the preliminary starting procedure (para 3–10) and starting procedure (para 3–11).

NOTE

For initial equipment operation, manually trip and then reset both the BATTERY BREAKER and CIRCUIT BREAKER on the audio monitor.

b. On the control converter, check that the POWER switch is set to ON. The 5 VDC/28 VDC POWER lamps and FAULT LINK indicator will light.

c. On the main receiver, set the LOCAL/REMOTE CONTROL switch to REMOTE. The following displays should appear:

(1) FREQUENCY KHz digital readout indicators will display 00000.0 KHz on the synthesizer.

(2) The FAULT lamps on all front panels will light with the exception of the automatic frequency control and the audio monitor.

(3) The VFCT indicator section of the four OPERATING MODE indicators on the receivers will light.

(4) The OPERATE lamp in the OPERATE/STANDBY indicator switch on the audio monitor will remain lit.

(5) The AFC ON lamp in the AFC ON/CARR FAIL indicator switch on the automatic frequency control, if initially lit will go off.

d. On the remote control, set the POWER switch to ON and wait 20 seconds. The lamps in the POWER, FAULT-LINK, and CONTROL avail indicators will light; all other indicator lamps will remain off.

e. Momentarily press the LINK FAULT TEST switch. The following indications will appear:

(1) The FAULT LINK lamp will go off and the FAULT RCVR lamp will light (the FAULT COMMAND lamp will remain off).

(2) The CONTROL AVAIL lamp will light and the CONTROL OVERRIDE lamp will remain off.

(3) All other remote control indicators will remain off until further remote operator action.

NOTE

The lamp in the FAULT LINK indicator on the control converter will also go off when the LINK TEST switch is pressed.

f. Set the RCVR OPR/STBY switch to OPR.

g. Press the FUNCTION SET RCVR pushbutton switch to its locked-in position.

h. Momentarily press the COMMAND INITIATE pushbutton switch; the OPR lamp in the RCVR OPR-STBY indicator should light.

i. Set the CHAN B2 VO-VFCT-DATA switch to VO, VFCT, or DATA as desired.

i. Press the FUNCTION SET CHAN B2 pushbutton switch to its locked-in position.

k. Momentarily press the COMMAND INITIATE pushbutton switch. The AGC TIME CONSTANTS B2 VO-VFCT-DATA indicator will light in accordance with the CHAN B2 VO-VFCT-DATA switch setting.

l. Set the CHAN B1 VO-VFCT-DATA switch to VO, VFCT, or DATA as desired.

m. Press the FUNCTION SET CHAN B1 pushbutton switch to its locked-in position.

n. Momentarily press the COMMAND INITIATE pushbutton switch. The AGC TIME CONSTANTS B1 VO-VFCT-DATA indicator will light in accordance with the CHAN B1 VO-VFCT-DATA switch setting.

o. Set the CHAN A1 VO-VFCT-DATA switch to VO, VFCT, or DATA as desired.

p. Press the FUNCTION SET CHAN A1 pushbutton switch to its locked-in position.

q. Momentarily press the COMMAND INITIATE pushbutton switch. The AGC TIME CONSTANTS A1 VO-VFCT-DATA indicators will light in accordance with the CHAN A1 VO-VFCT-DATA switch setting.

r. Set the CHAN A2 VO-VFCT-DATA switch to VO, VFCT, or DATA as desired.

s. Press the FUNCTION SET CHAN A2 pushbutton switch to its locked-in position.

t. Momentarily press the COMMAND INITIATE pushbutton switch. The AGC TIME CONSTANTS A2 VO-VFCT-DATA indicator will light in accordance with the CHAN A2 VO-VFCT-DATA switch setting.

u. Set the desired operating frequency, using the six FREQ KHz thumbwheel switches.

v. Press the FUNCTION SET FREQ pushbutton switch to its locked-in position.

w. Momentarily press the COMMAND INITIATE pushbutton switch. The FREQ lamp in the READY-FREQ indicator will light within 2 seconds, and the lamp FAULT RCVR indicator will extinguish. The READY lamp in the READY-FREQ indicator will light within 10 seconds to indicate that the receiving set is ready to handle traffic.

x. If the afc-on mode is desired, set the AFC ON-OFF switch to ON to activate automatic frequency control circuits.

y. Press the FUNCTION SET AFC pushbutton switch to its locked-in position.

z. Momentarily press the COMMAND INITIATE pushbutton switch. The AFC ON-OFF indicator will light in accordance with the AFC ON-OFF switch setting.

3–14. Changing Remote Control Commands

To change frequency or agc time constants, or remove automatic frequency control by use of the remote control, perform the procedures given in *a*, *b*, and *c* below.

a. Frequency Change. Change the frequency as follows:

(1) Set the desired frequency, from 02000.0 to 29999.9 KHz, using the six FREQ KHz thumbwheel switches. The FREQ lamp in the READY/FREQ indicator will go off with the first change in any FREQ KHz thumbwheel switches.

(2) Press the FUNCTION SET FREQ switch to its locked-in position.

(3) Momentarily press the COMMAND INITIATE switch. The READY lamp in the READY/FREQ indicator, if initially lit, will go off. (If the FREQ KHz switches were initially at the desired setting, and were not changed in step (1) above, the FREQ lamp will go off with the READY lamp, instead of a change in FREQ KHz switch settings.)

(4) The FREQ lamp will light within 2 seconds. The READY lamp will then light within 10 seconds, indicating that the receiving set is ready for traffic at the new frequency.

b. Agc Time Constant Change. The agc time constant may be changed for any of the four channels (B2, B1, A1, or A2) from the remote control as follows:

(1) Set the CHAN VO-VFCT-DATA switch for the desired channel (B1, B2, B3, A1, or A2) VO, VFCT, or DATA.

(2) Press the FUNCTION SET CHAN switch for the desired channel (B2, B1, A1, or A2) to its locked-in position.

(3) Momentarily press the COMMAND INITIATE pushbutton switch. The initially lit lamp in the AGC TIME CONSTANTS VO-VFCT-DATA indicator for the selected channel (B2, B1, A1, or A2) will extinguish, and the VO, VFCT, or DATA indicator will light in accordance with the CHAN VO-VFCT-DATA switch setting.

c. Afc ON-OFF Change. Set the automatic frequency control either ON or OFF from the remote control as follows:

(1) Set the AFC ON-OFF switch to the position corresponding to the desired automatic frequency control condition.

(2) Press the FUNCTION SET AFC pushbutton switch to its locked-in position.

(3) Momentarily press the COMMAND

initiate pushbutton switch. The lamp initially lit in the AFC ON-OFF indicator (para 3-12*f*) will extinguish, and the ON or OFF lamp will light in accordance with the AFC ON-OFF switch setting.

3-15. Remote Control Fault Condition Reset

The remote control subsystem command fault and link fault conditions may be reset from the remote control as follows:

a. Command Fault Reset. The command fault condition may be cleared, and the FAULT COMMAND indicator turned off, by momentarily pressing the COMMAND INITIATE pushbutton switch to re-initiate the command in which the fault occurred. If this action does not turn off the FAULT COMMAND indicator, refer to paragraphs 4-9 and 4-10.

b. Link Fault Reset. The link fault condition may be cleared and the FAULT LINK indicator on the remote control turned off by momentarily pressing the remote control LINK FAULT TEST switch. If this action does not turn off the FAULT LINK lamp, corrective maintenance is required. Refer to paragraphs 4-9 and 4-10.

3-16. Stopping Procedure

The entire receiving set may be placed in standby or shutdown as follows. Use the procedure in a (local) or *b* (remote) depending on existing equipment of operation.

a. Local Mode of Operation. With the receiving set in the local mode, perform the following steps at the receiver group:

(1) To place the receiving set in standby, press the OPERATE/STANDBY indicator switch on the audio monitor. The OPERATE lamp will go off and the STANDBY lamp will light.

NOTE

Standby is the normal nonoperating condition for the equipment. During standby the crystal ovens are kept energized by the audio monitor battery pack to maintain crystal stability. If the equipment is shutdown, at least 1 hour of warmup time is required.

(2) To shut down the receiving set, place the MAIN POWER switch on the power distribution panel to OFF and pull out the BATTERY BREAKER switch on the audio monitor. This removes primary power from all components of the receiving set except the remote control.

b. Remote Mode of Operation. Starting with the equipment in the remote mode, place the receiving set in standby or shut down the equipment as follows:

(1) On the remote control, set the RCVR OPR/STBY switch to STBY.

(2) Press the FUNCTION SET RCVR switch to its locked-in position.

(3) Momentarily press the COMMAND INITIATE switch. The RCVR OPR lamp will go off and the RCVR STBY lamp will light, signifying that the receiving set is now in standby.

(4) To shut down the remote control subsystem, return the control of the receiving set to the local operator by setting the LOCAL/REMOTE CONTROL switch on the main receiver to LOCAL (fig. 3-2).

(5) On the remote control place POWER ON/OFF switch at OFF. Observe that all indicator lamps go off.

(6) On the control converter observe that the FAULT-LINK lamp comes on when power is removed from remote control. Set the POWER switch to OFF. The POWER +5 VDC, +28 VDC and FAULT-LINK lamps will go off.

NOTE

If desired, frequency and channel AGC time constants may be set into the receivers prior to setting the LOCAL/REMOTE switch to the LOCAL position. All other local control operations must be performed with this switch in the LOCAL position.

(7) On the remote control, observe that the FAULT LINK and CONTROL OVERRIDE lamps are lit and that all other remote control indicators (except the POWER lamp) are off.

(8) Set the POWER switch on the remote control to off. All lamps will go off.

NOTE

The receiving set is now in standby and in the local mode of operation. To shut down the receiving set, follow the procedure given in paragraph 3-16*a*(2) above.

CHAPTER 4

OPERATOR'S MAINTENANCE INSTRUCTIONS

4–1. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of Receiving Set, Radio AN/FRR–79 are listed below together with a reference to the paragraphs covering the specific maintenance function. The duties include performing preventive and corrective maintenance and do not require the use of tools or test equipment.

a. Operator's daily preventive maintenance checks and services chart (para 4–5).

b. Operator's weekly preventive maintenance checks and services chart (para 4–6).

c. Cleaning (para 4–7).

d. Remote control command checkout (para 4–8).

e. Troubleshooting (para 4–9 and 4–10).

f. Repairs and adjustments (para 4–11).

4–2. Materials Required

The following materials are required for operator's maintenance

a. Cleaning Compound (FSN 7930–395–9542).

b. Brush.

c. Lint-free cloth (FSN 8305–267–3015).

d. No. 00 or 000 snadpaper.

e. Detergent.

4–3. Operator's Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, reduce downtime, and assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 4–4 through 4–7 cover routine systematic care and cleaning essential to the proper upkeep of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services charts (para 4–5 and 4–6) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat-serviceable condition; that is, in good general (physical) condition and in good operation condition. To assist operators in maintaining combat serviceability, the chart indicates what to check, how to check, and what the normal conditions are; the *References* column lists the paragraphs that contain detailed maintenance procedures. If a defect is observed, refer to the troubleshooting chart (para 4–10). Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38–750.

4–4. Operator's Preventive Maintenance Checks and Services Periods

Daily and weekly preventive maintenance checks and services must be performed on the AN/FRR–79.

a. The operator's daily preventive maintenance checks and services chart (para 4–5) specifies the checks which must be made on a daily basis.

b. The operator's weekly preventive maintenance checks and services chart (para 4–6) specifies the checks which must be made during scheduled downtime weekly preventive maintenance periods.

4-5. Operator's Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Cables and connections (entering and leaving equipment).	Check all cables for evidence of chafing, cracking, or excessive strain. Check all electrical connectors for dents, cracks, or chips.	Refer to higher category of maintenance for replacement.
2	Exterior surfaces	Clean exterior surfaces of electrical equipment cabinet and each major component front panel. Clean meter glasses and window covering synthesizer digital readout indicators.	Paragraph 4-7.
3	Knobs, dials, and switches	Observe mechanical action of each knob, dial, and switch for smoothness and freedom from external or internal binding.	Paragraph 4-11.
4	Fuses	Check power distribution panel fuse-indicators. All fuse-indicators should be off when MAIN ON-OFF POWER switch is set to ON.	Paragraph 4-10.
5	Blowers	Place hand in front of filters on synthesizer, main and deversity receivers, automatic frequency control, and audio monitor. Be sure that there is an adequate flow of air.	Paragraph 4-10.
6	Lamps	On front panels of major components, press LAMP TEST switch. Be sure that all indicator lamps light.	Paragraph 4-10.
7	Synthesizer circuit	Rotate synthesizer CIRCUIT TEST switch to each position marked green, and note that CIRCUIT TEST meter indication is in green area.	Paragraph 4-10.
8	Main and diversity receiver circuits.	Rotate main and diversity receivers CIRCUIT TEST switches to each position marked green, and note that corresponding CIRCUIT TEST meter indication is in green area.	Paragraph 4-10.
9	Automatic frequency control circuit.	Rotate automatic frequency control CIRCUIT TEST switch to each position marked green, and note that corresponding CIRCUIT TEST meter indication is in green area.	Paragraph 4-10.
10	Audio monitor circuit	Rotate audio monitor CIRCUIT TEST switch to each position marked green, and note that corresponding CIRCUIT TEST meter indication is in green area.	Paragraph 4-10.

4-6. Operator's Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Local frequency selection	On synthesizer, rotate each KHz selector switch through all positions, and note that associated FREQUENCY KHz digital readout indicator provides proper readouts.	Refer to higher category of maintenance.
2	Local age time constant selection	On the main receiver, rotate each OPERATING MODE selector switch through all four positions, and note that associated OPERATING MODE indicators on both main and diversity receivers provide proper displays.	Refer to higher category of maintenance.

Sequence No.	Item to be inspected	Procedure	References
3	Remote frequency selection	Tune receiving set to various frequencies from remote control; note frequency readings on synthesizer.	Paragraph 4–8.
4	Remote agc time constant selection	Select agc time constants from remote control; note indications on main and diversity receivers OPERATING MODE indicators.	Paragraph 4–8.

4–7. Cleaning

All exterior surfaces of the equipment should be free of dirt, grease, and fungus. Perform the following procedures as specified in the preventive maintenance checks and services charts.

a. Remove moisture and loose dirt with a clean, soft cloth.

***Warning:* Prolonged breathing of cleaning compound is dangerous; make sure that adequate ventilation is provided. Cleaning compound is flammable; do not use near a flame. Avoid contact with the skin; wash off any that spills on the hands.**

***Caution:* Do not use the cleaning compound on the plastic windows which cover the synthesizer digital readout indicators; the windows will become damaged.**

b. Remove grease, fungus, and ground-in dirt from the exterior surfaces of the electrical equipment cabinet and the remote control with a cloth dampened (not wet) with the cleaning compound. Wipe surfaces dry with a clean, dry, lint-free cloth.

***Caution:* Do not press on the meter faces; excessive pressure can break the meter face and cause damage to the meter movement.**

c. Clean the front panel and controls; use a clean, soft cloth. If dirt is difficult to remove, dampen the cloth in water; if necessary, use a mild detergent.

d. To preserve the appearance of the equipment and reduce corrosion, retouch painted surfaces where paint has been gouged or scraped off. Before repainting a defective area, use the cleaning compound to remove dirt, dust, grease, and other foreign matter. Use #00 or #000 sandpaper (FSN 5350–271–7939) and the cleaning compound to clean the surface down to the bare metal. Use a clean, soft cloth to remove loose dust and metal particles. Brush two thin coats of paint on the bare metal. Refer to the applicable cleaning and refinishing practices specified in TM 9–213 and TB SIG 364.

e. Remove the air filter elements from the electrical equipment cabinet front panels. Clean dirty filter elements by brushing off loose dirt with a dry brush, or vacuum if a vacuum cleaner is available. Soak each element in water which contains a mild detergent. Dry elements thoroughly before replacing.

4–8. Remote Control Command Checkout

Use the procedures given below to check the ability of the remote control to change the operating frequency and time constant of the receiver group.

Note. If the results obtained in the procedures are not correct, refer to the higher category of maintenance.

a. Establish communication with the remote control site.

b. Place the receiving set in the remote mode in accordance with the preliminary starting procedure (para 3–10) and the starting procedure (para 3–11).

c. Instruct the remote operator to tune the receiving set to 11,111.1 KHz from the remote control (para 3–13). Check to see that the synthesizer FREQUENCY KHz digital readout indicators display 11,111.1 KHz.

d. Instruct the remote operator to tune the receiving set to each of the frequencies listed below, using procedures given in paragraph 3–14*a*. Check to see that equivalent frequencies are displayed on the synthesizer.

(1) 22,222.2 KHz.
(2) 3,333.3 KHz.
(3) 4,444.4 KHz.
(4) 5,555.5 KHz.

(5) 6,666.6 KHz.
(6) 7,777.7 KHz.
(7) 8,888.8 KHz.
(8) 9,999.9 KHz.

e. Instruct the remote operator to select the agc time constants for voice (para 3–13). Check to see that the main and diversity receivers OPERATING MODE indicators display VOICE.

f. Instruct the remote control operator to select vfct and data agc time constants using procedures given in paragraph 3–14*b*. Check to see that the proper display appears on the main and diversity receivers.

g. Instruct the remote operator to place the receiving set in the afc-on and afc-off conditions (para 3–13*x* and 3–14*c*). Check to see that the automatic frequency control AFC ON-CARR FAIL indicator displays the proper indication.

4–9. Operator Troubleshooting

Operator troubleshooting is confined to localizing the trouble to a defective major component, or to such exterior items as panel lamps, fuses, knobs, improper mating of connectors, or defective cables or connectors. Operator troubleshooting of the receiving set is based on the daily and weekly operational checks specified in the operator's preventive maintenance checks and services charts (para 4–5 and 4–6). To troubleshoot the equipment, perform all the checks in sequence in the operator's daily and weekly preventive maintenance checks and services charts. When an abnormal indication or result is obtained, note the reference in the *References* column and perform the corrective measurse indicated in the operator's troubleshooting chart (para 4–10). If the corrective measures do not eliminate the malfunction, a higher category maintenance repair is required.

4–10. Operator's Troubleshooting Chart

Item No.	*Trouble symptom*	*Probable trouble*	*Checks and corrective measures*
1	Starting procedure cannot be accomplished.	Defective control or component in receiver group.	Refer to higher category maintenance.
2	Power distribution panel fuse-indicator lights.	Blown fuse	Paragraph 4–11.
3	Equipment cannot be place in operational status.	Defective control or component in receiver group.	Refer to higher category maintenance.
4	No air movement felt at air intake on front panel of components.	*a.* Obstruction at air intake or outlet.	*a.* Remove filter element and check for obstruction. Check for obstruction at air outlet at rear of component chassis.
		b. Dirty air filter	*b.* Clean air filter.
		c. If FANS fuse-indicator is lighted, fuse in control converter is blown.	*c.* Replace fuse (para 4–11).
		d. Defective blower motor, or associated circuit.	*d.* Refer to higher category maintenance.
5	Lamp on front panel of major component does not light when LAMP TEST switch is pressed and power is applied to major component.	*a.* Defective lamp	*a.* Replace lamp (para 4–11).
		b. Defective lampholder assembly	*b.* Refer to higher category maintenance.
6	Synthesizer circuit tests produce out-of-green-area indication on CIRCUIT TEST meter.	Defective synthesizer	Refer to higher category maintenance.
7	Main receiver or diversity receiver circuit tests produce out-of-green-area indication on CIRCUIT TEST meter.	Defective receiver	Refer to higher category maintenance.

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
8	Automatic frequency control circuit tests produce out-of-green-area indication on CIRCUIT TEST meter.	Defective automatic frequency control.	Refer to higher category maintenance.
9	Audio monitor circuit tests produce out-of-green-area indication of CIRCUIT TEST meter.	Defective audio monitor	Refer to higher category maintenance.
10	Local operation cannot be accomplished.	Defective control, indicator, or component in receiver group.	Refer to higher category maintenance.
11	Remote operation cannot be accomplished.	Defective remote control, or control converter.	Refer to higher category maintenance.

4–11. Operator Repairs and Adjustments

a. Replacement of Indicator Lamps.

NOTE

This procedure is applicable to all indicators and inidicator switch assemblies, except the main and diversity receivers OPERATING MODE indicator assemblies. To remove the OPERATING MODE indicator assemblies, pull them forward until a detent is felt. Rotate the OPERATING MODE indicator assemblies 90° counterclockwise and remove them from the front panel.

(1) Grasp indicator assembly by inserting fingernails into slots provided on sides of indicator assembly and pull forward.

(2) With the fingernails, grasp the lamp by the flange and pull forward, and rotate assembly 90° to release.

(3) Insert a new lamp into the socket and apply slight pressure to seat the lamp properly.

(4) Insert the indicator assembly into the chassis socket and apply slight pressure until locking detent is felt (or heard) falling into position, then rotate assembly 90° clockwise and press in.

b. Replacement of Control Knobs.

(1) Mentally record the pointer position of the control knob to be replaced.

(2) With an Allen Wrench, loosen the two setscrews and remove the knob from the shaft by pulling it forward.

(3) Position a new knob on the shaft with the pointer oriented to its original position.

(4) With the Allen Wrench, tighten the two setscrews.

c. Replacement of Fuses. There are 16 fuse indicators on the power distribution panel. If the indicator lamp lights, the associated fuse is blown. Replace a blown fuse as follows:

(1) Turn the fuse-indicator counterclockwise and remove the fuseholder from the front panel.

(2) Remove and discard the blown fuse from the fuseholder.

(3) Remove the two screws which secure the spare fuse cover. Select a fuse with the same current rating from the spare fuse panel.

(4) Insert the replacement fuse in the fuseholder and reinsert the fuseholder into the fuse-indicator.

(5) Replace the spare fuse cover.

CAUTION

If the fuse-indicator lights after replacement of a fuse, an overload condition is evident. Refer to a higher category of maintenance for corrective action.

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CHAPTER 2

FUNCTIONING OF EQUIPMENT

Section I. GENERAL FUNCTIONING OF RECEIVING SET

2-1. Scope

This section contains the functional analysis of the overall receiving set, and functional analyses of the major components (except synthesizer 1A2 which is discussed in TM 11-5820-598-35-2) and remote control subsystem. The arrangement of this chapter is as follows:

Section I	General Functioning of Receiving Set.
Section II	Electrical Equipment Cabinet 1A1 Functional Analysis.
Section III	Main 1A3 and Diversity 1A4 Receivers Functional Analysis.
Section IV	Automatic Frequency Control 1A5 Functional Analysis.
Section V	Audio Monitor 1A6 Functional Analysis.
Section VI	Remote Control Subsytem Functional Analysis.
Section VII	Remote Control Unit 2 Functional Analysis.
Section VIII	Control Converter 1A7 Functional Analysis.
Section IX	Control Converter 1A7 and Remote Control Unit 2 Logic Card Description.
Section X	Power Distribution Circuits.

2-2. General

The receiving set is a self-contained, high frequency, remotely or locally controlled, independent sideband receiving system, intended for general purpose, fixed ground station operation. The receiving set is used in conjunction with other communications equipment (i.e., telephones, teletypewriters, facsimile recorders, etc.), normally provided at a communications or signal terminal center, and is intended to receive transmissions in the 2- to 29.9999-MHz frequency range, containing up to four separate voice frequency intelligence channels or up to 64 separate data channels. Space diversity operation, utilizing two separate antennas, is employed.

2-3. Overall Receiving Set Block Diagram Description

Figure 7-2 is a block diagram of the receiving set showing the functional relationship of its units and components. The incoming RF signals from the main and diversity antennas are connected to the receiver group electrical equipment cabinet 1A1 at data distribution panel 1A1A2. The received signals are fed through antenna protectors and routed direct to main receiver 1A3 and diversity receiver 1A4. The antenna protectors disconnect the receivers from the antennas when the receiving set is off or in standby and during the time the receivers are tuning. These devices protect the receivers from stray incoming signals that may damage front-end circuitry during a deenergized condition; they also prevent low level tuning signals that are generated within the receiver preselectors during the tuning cycle from reradiating into the antennas.

2-4. Main 1A3 and Diversity 1A4 Receivers and Audio Monitor 1A6

In each of the two receivers, the incoming signal is demodulated, separated into independent audio channels, amplified and fed to audio monitor 1A6. The audio monitor provides phase equalization and amplification for all eight channels (four each from the main and diversity receivers) and provides facilities for audible and visual monitoring of the individual audio channel output lines. The audio monitor also contains the standby-operate power control circuitry of the receiver group and in addition, provides standby and emergency power to the major components of the receiver group. The eight audio channels are routed from the audio monitor to terminal boards 1A1A2TB2 and TB3 on the data distribution panel. The data distribution panel provides the interface between the receiver group and the station terminal equipment.

2-5. Synthesizer 1A2

Synthesizer 1A2 generates variable frequency oscillator (vfo) and local oscillator (lo) injection frequencies required to tune the main and diversity receivers from 2 to 29.9999 MHz in 100-Hz steps. It also provides the appropriate fixed carrier reinsertion frequencies used in the receivers to produce four independent audio channels from each receiver. The vfo injection frequency used by the vhf mixer in each receiver varies from 151.75 to 161.74999 MHz in 100-Hz steps. The vfo signal is fed from the synthesizer to hybrid amplifier 1A1A4A4 located on RF distribution panel 1A1A4. From the hybrid amplifier, the vfo signal is applied simultaneously to each receiver. The lo injection frequency for the hf mixers is either a 130-, 140-, or 150-MHz signal, depending upon the selected frequency band (A, B, or C). This signal is routed to each receiver via amplifier 1A1A4A5 on the RF distribution panel. The fixed carrier reinsertion frequencies are 1.74371 MHz (A2 channels), 1.75629 MHz (B2 channels), and 1.75 MHz (A1 and B1 channels). These signals are fed to each receiver via hybrid networks 1A1A4, A1, A2, and A3, respectively. The synthesizer also supplies 1.75 MHz and 1.0 MHz as fixed reference frequencies to automatic frequency control 1A5. The 1.75-MHz signal is obtained from hybrid network 1A1A4A3 and routed to the automatic frequency control. The 1.0-MHz signal is fed direct from the synthesizer to the automatic frequency control. The synthesizer is designed to permit either local or remote frequency selection. Local frequency selection capability is provided by controls mounted on the synthesizer front panel. Remote frequency selection is accomplished by commands initiated at the remote control unit 2 via a data link to control converter 1A7. Interface between the remote control unit and the control converter is made via terminal board 1A1A2TB1 on the data distribution panel.

2-6. Automatic Frequency Control 1A5

The automatic frequency control 1A5, when selected, compensates for the frequency drift of a received signal, provided a reference carrier is being transmitted. The AFC acquisition range is ±55 Hz. The output of the AFC unit, a 22-MHz ±2 kHz phase locked signal, is returned to the synthesizer where it is used to control the variable injection frequency required to tune the receivers precisely to the incoming reference carrier. A sample of the 1.75 MHz IF carrier signal is selected from either the main or diversity receiver and compared in the AF[illegible] fixed reference frequency supplied thesizer. When the received signal frequency exactly the same as the frequency to which the receiver is tuned, the output of the automatic frequency control is maintained at precisely 22 MHz. Any deviation (up to ±2 kHz) of the received frequency from the receiver tuned frequency will produce a corresponding deviation in frequency of the 22-MHz output of the automatic frequency control. This frequency deviation will cause the synthesizer to retune the receiver precisely to remain phase locked with the received input frequency. A fine tune feature provided on the AFC front panel, enables the local operator to manually vary the receiving set tuned frequency selected at the synthesizer by plus or minus 500 Hz. The fine tune capability is provided in the local condition only and when selected disables the AFC mode. This feature is provided for interpolation of the received frequency to permit operation with unstable signals where no carrier is being transmitted.

2-7. Power Control and Distribution—Electrical Equipment Cabinet 1A1

Primary (ac line) power for operation of the components of the receiver group is connected to power distribution panel 1A1A1 in the electrical equipment cabinet. During standby operation, ac power is supplied to the audio monitor and control converter only. The audio monitor employs a battery pack/battery charger combination which supplies standby dc power to the reference signal generator in the synthesizer and the memory circuits in the control converter. A separate +18-volt output from the power supply in the audio monitor provides standby power for the crystal oven in the automatic frequency control. If prime power fails, the audio monitor battery continues to supply power to the synthesizer crystal oven and control converter memory circuits for at least 6 hours. During normal operation, each component in the receiver group is energized by its own internal +18 vdc power supply with the exception of the CCU memory which is always powered by the audio monitor battery supply. All component power supplies derive from the ac power provided via the power distribution panel. The remote control is a self-contained unit containing two internal dc power supplies

2-8. Summary Fault Interlock

The receiver group uses a summary fault interlock circuit to alert the operator to an

malfunction. Fault lamps on the synthesizer, receivers, automatic frequency control or audio monitor will illuminate to indicate a fault condition. A fault indication will result when any of the power supply outputs of the individual major components drop below a usable level or any of the following occur:

a. Loss of prime ac power.

b. Loss of synthesizer outputs (variable frequency or local oscillator injections).

c. Band selection failure.

d. Overload (circuit breaker tripped).

2–9. Remote Control Subsystem

The remote control subsystem consists of control converter 1A7 and remote control unit 2, which are interconnected through two neutral teletype loops or equivalent data link transmission channels. One loop provides serial transfer of control data from the remote control to the control converter. The other loop provides serial transfer or readback data from the control converter to the remote control. Interface between the remote control and control converter is established via terminal board 1A1A2TB1 on the data distribution panel in the electrical equipment cabinet. In addition to performing remote control functions, the control converter constantly monitors the status of the receiver group and sends status messages to the remote control each time a status change occurs. The status messages control the remote control front panel indicators which continuously display the operating status of the receiving set. When the remote control subsystem is not transmitting control or status information, it transmits a periodic link check message over the two teletype loops interconnecting the remote control with the control converter. The link check messages verify the integrity of the two teletype loops at 15-second intervals. Failure of either loop causes link fault indicators on the remote control and control converter to illuminate.

Section II. ELECTRICAL EQUIPMENT CABINET 1A1, FUNCTIONAL ANALYSIS

2–10. Introduction

This section contains a functional analysis of the electrical equipment cabinet. Preface all incomplete reference designations by the designation appearing in the main paragraph title unless the complete reference designation is given. For example, A1A2 or S1 is an incomplete reference designation whereas 2A1A2 is a complete reference designation. Figure 7–3 is an overall schematic diagram of the electrical equipment cabinet 1A1. The electrical equipment cabinet assembly consists of the modules listed below:

Reference designation	*Nomenclature*
1A1	Electrical equipment cabinet
1A1A1	Power distribution panel
1A1A2	Data distribution panel
1A1A2A1	Main antenna protector
1A1A2A2	Diversity antenna protector
1A1A4	RF distribution panel
1A1A4A1	1.75-MHz hybrid network
1A1A4A2	1.75-MHz hybrid network
1A1A4A3	1.75-MHz hybrid network
1A1A4A4	151.75–161.75-MHz hybrid amplifier
1A1A4A5	130/140/150-MHz hybrid amplifier

2–11. Power Distribution Panel 1A1A1 (fig. 7–4)

a. Facility-supplied 115/230 vac power is connected to the electrical equipment cabinet at terminal boards TB1–1 and –3. Ac Power is fed direct to convenience outlet 1A1J2 via indicating fuses F15 and F16. When the MAIN POWER CONTROL switch S1 is closed, ac power is routed via power fuses F1 and F2 to POWER ON indicator lamp DS1, to audio monitor 1A6 via fuses F3 and F4, and to control converter 1A7 via fuses F13 and F14.

b. During standby operation of the receiving set, no other components receive ac power. During the operate condition, ac power is also supplied to the remaining components through the closed contacts of power distribution control relays K1 and K2. As shown in figure 7–4, each line is separately fused. For a complete overall description of the operate/standby conditions, refer to section X.

2–12. Data Distribution Panel 1A1A2 (fig. 7–5)

The data distribution panel contains antenna protectors A1 and A2, and terminal boards TB1,

TB2, and TB3. The protection circuits serve to keep stray signals from damaging the main or diversity antennas by isolating them during the receiver tune cycle, by grounding the receiver inputs. Terminal boards TB1, TB2, and TB3 provide for interface between various components within the electrical equipment cabinet, the remote control unit and the station audio distribution frame.

a. Antenna Protectors A1 and A2. Antenna protectors A1 and A2 are identical, only A1 is described. During normal operation (receiving set not tuning), the main antenna signal is received at J1 and routed to the main receiver through coupling capacitor C1 and relay K1 (operated). Relay K1 is operated by +18 vdc from standby relay 1A6K1 in the audio monitor (fig. 7–37) and a ground supplied from the preselector portion of the main receiver. When a frequency change is made at the synthesizer (receiving set in tune cycle) the ground is removed by tune relay 1A3A35A39K1 (para 2–25) in the main receiver to restore relay K1 disconnecting the antenna and grounding the antenna input. When the preselector tune cycle is complete the ground is reapplied to operate relay K1 for normal operation.

b. Terminal Boards TB1, TB2, and TB3. Terminal boards TB1, TB2, and TB3 provide for interconnection as shown in figure 7–8.

2–13. RF Distribution Panel 1A1A4
(fig. 2–1)

The RF distribution panel A4 contains three 1.75-MHz hybrid networks A1, A2, and A3, a 151.75–161.75-MHz hybrid amplifier A4, and 130/140/150-MHz hybrid amplifier A5. These modules receive signals from the synthesizer and provide individual isolated outputs for the main and diversity receivers. The A1 hybrid network provides 1.74371-MHz signals, the A2 hybrid network provides 1.75629-MHz signals, the A3 hybrid network provides 1.75-MHz signals, hybrid amplifier A4 provides signals between 151.75 and 161.75 MHz, and hybrid amplifier A5 provides 130-, 140-, or 150-MHz signals. In addition, module A3 provides a 1.75-MHz signal as a reference for the automatic frequency control. Assembly A4 comprises terminal board A4TB1 and 1 MHz external standard input jack A4J1. The terminal board receives its +18 vdc supply from the audio monitor. External standard input Jack A1A4J1 is connected direct to the synthesizer by a coaxial cable.

a. 1.75-MHz Hybrid Networks A1 and A2 (fig. 2–2). These units are identical and are broadband to accept frequencies of 1.74371 and 1.75629 MHz. The hybrid acts as a three port power divider network which divides the power equally between the two 50-ohm outputs connected to the main and diversity receivers.

b. 1.75-MHz Hybrid Network A3 (fig. 2–3). This network has a 50-ohm input and three 50-ohm outputs. It provides 1.75-MHz signal to the 50-ohm ports connected to the main and diversity receivers and via a third 50-ohm output to the automatic frequency control.

c. 151.75–161.75-MHz Hybrid Amplifier A4. The 151.75–161.75-MHz hybrid amplifier (fig. 7–6) is used to amplify and divide the variable frequency oscillation (vfo) signals to the main and diversity receivers from the common synthesizer output and to isolate the receiver vfo ports from each other. The amplifier consists of three basic parts: an input amplifier A4A3 which is common to both output amplifiers A4A1 and A4A2 which are identical.

(1) *Input amplifier A3.* The input amplifier consists of a single common emitter stage, Q1. Input transformer T1 matches the 50-ohm input to approximately 25 ohms, and R2 acts as an input load. Capacitor C5 couples the signal to the base of Q1 which is biased to its correct operating point by resistors R1 and R3. Negative feedback is provided by emitter resistor R4. The load of the stage is essentially a bandpass filter network formed by C6, L3, L4, L5, and C7 which restricts the bandwidth to approximately 20 MHz. Capacitor C4 and transformer T2 match the output of the amplifier to approximately 50 ohms to drive the two output amplifier stages in parallel.

(2) *Output amplifiers A1 and A2.* Amplifiers A1 and A2 are identical, only A1 is described. The output amplifier consists of two common emitter stages in cascade. The first stage is similar to the input amplifier described in the previous paragraph. Resistors R3 and R4 comprise part of a resistive isolation network, C3 couples the signal to the base of Q1. Resistors R1, R5 provide correct bias for the stage and R6 provides negative feedback. Tuned filter C7, L5, L3, L6, C4, and C8 restricts the overall bandwidth to 20 MHz and matches the output of the first stage to the input of the second stage via capacitive divider C4, C8 and load resistor R7. Output level of the amplifier is adjusted by variable re-

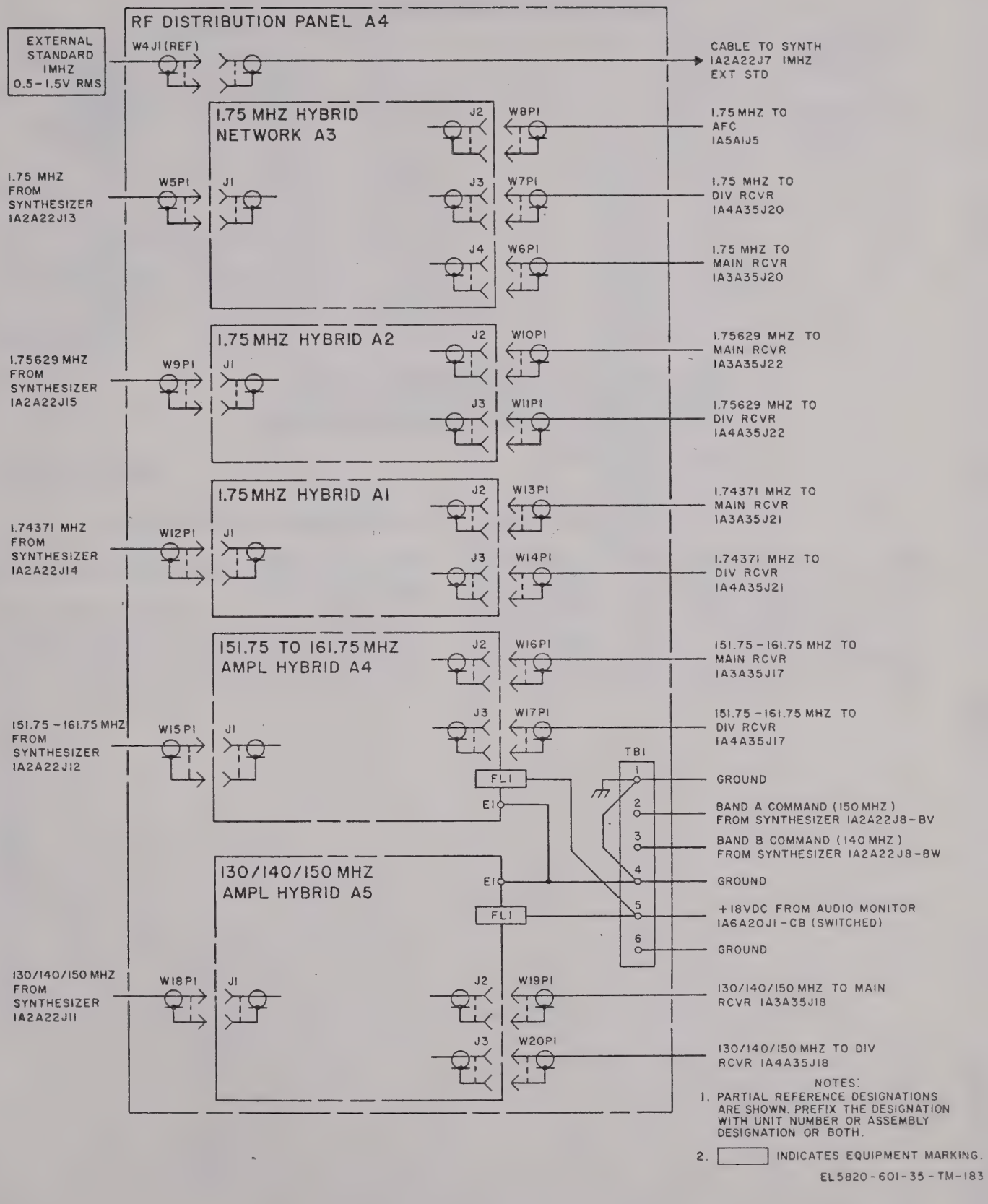


Figure 2-1. RF distribution panel 1A1A4, schematic diagram.

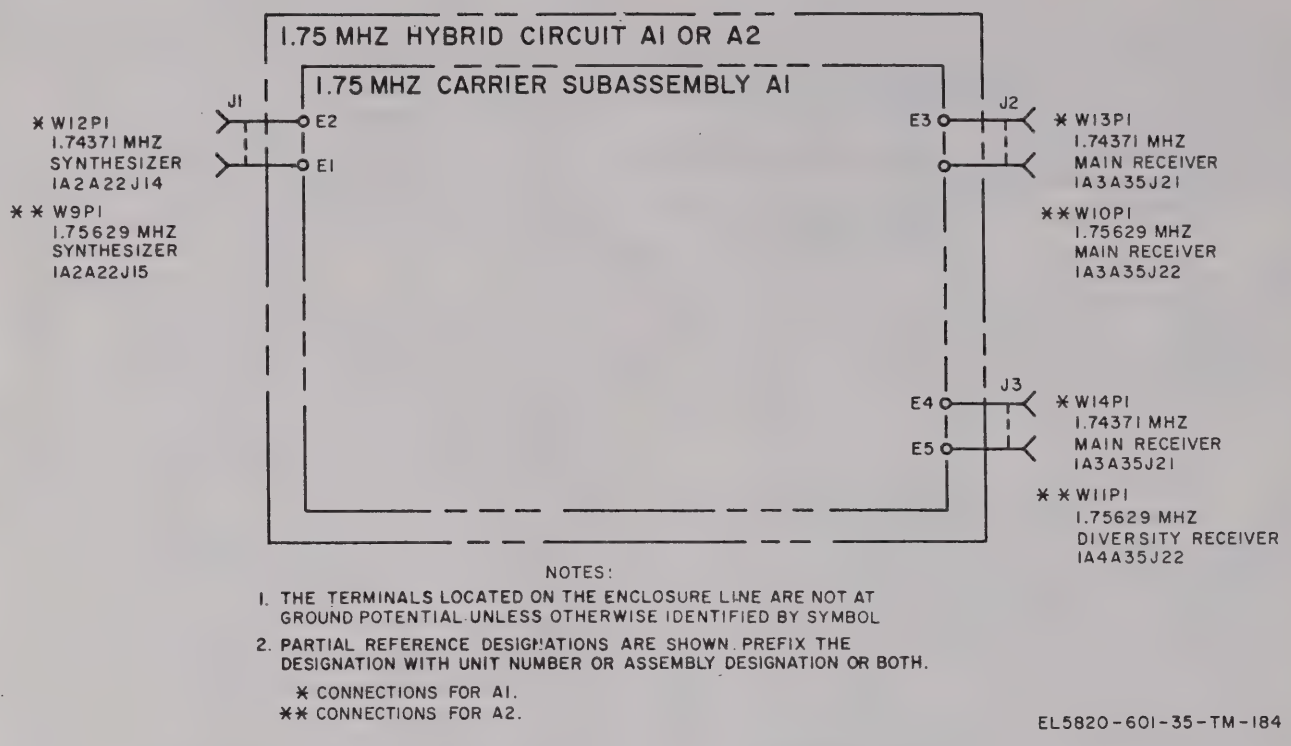
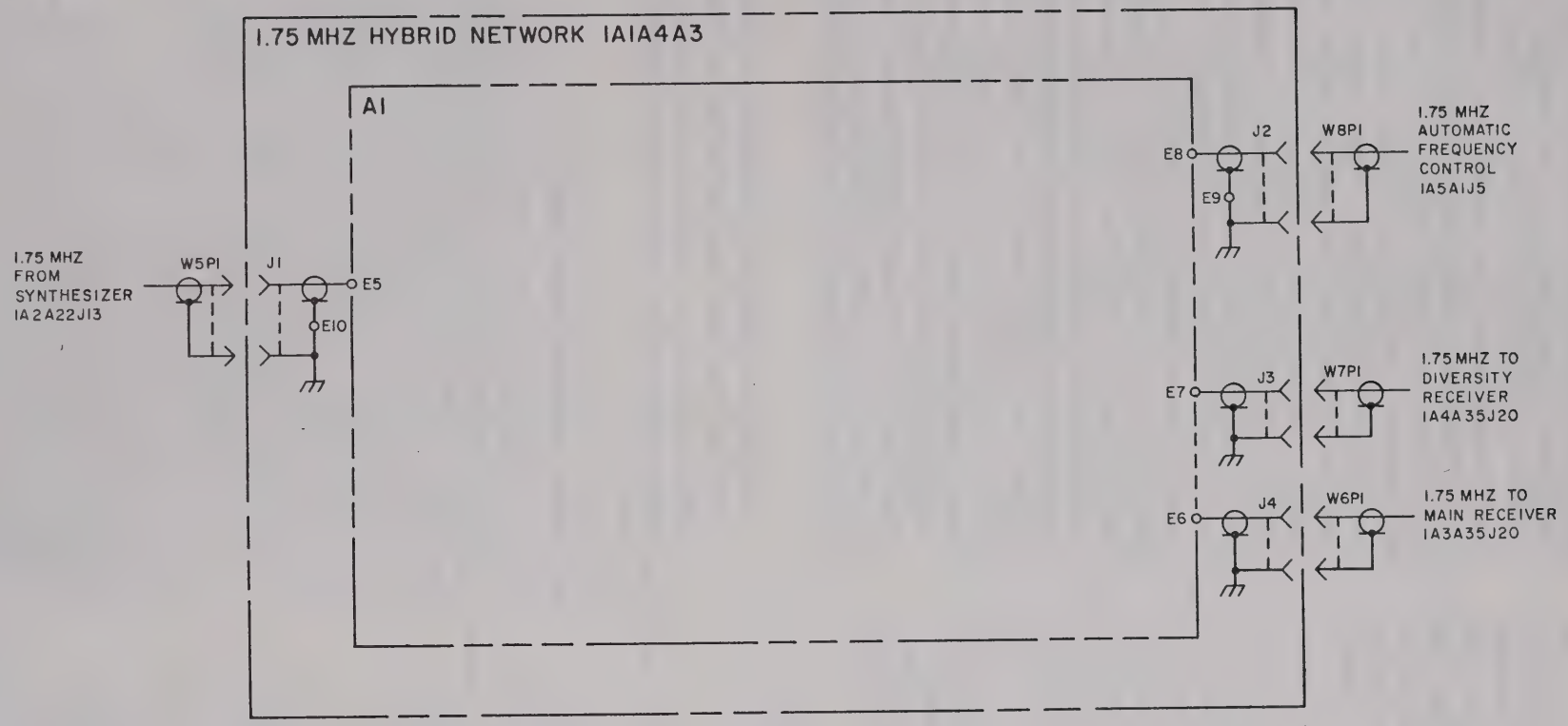


Figure 2–2. 1.75-MHz hybrid networks 1A1A4A1 and 1A1A4A2, schematic diagram.

sistor R8 and fixed resistor R9. Capacitor C5 couples the signal to the base of Q2 which is biased by R2, R10. Resistor R11 provides negative feedback. Inductor L4 and capacitors C6 (variable) and C9 (fixed) form a parallel tuned circuit and output match. Resistors R12, R13, and R14 form a 6-db loss pad which insures a good output vswr at J2.

d. 130/140/150-MHz Hybrid Amplifier A5. The 130/140/150-MHz hybrid amplifier (fig. 7–7) is identical to the 151.75–161.75 hybrid amplifier A4 except for the tuning parameters.



NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
2. THE TERMINALS LOCATED ON THE ENCLOSURE LINE ARE NOT AT GROUND POTENTIAL UNLESS OTHERWISE IDENTIFIED BY SYMBOL.

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Figure 2–3. 1.75–MHz hybrid network 1A1A4A3, schematic diagram.

Section III. MAIN 1A3 AND DIVERSITY 1A4 RECEIVERS, FUNCTIONAL ANALYSIS

2-14. Introduction

This section contains a functional analysis of the main and diversity receivers. Since these components are functionally identical, the data presented here is applicable to a typical receiver. The main and diversity receivers each contain the modules listed below. Figure 7-8 is an overall schematic diagram of the main and/or diversity receivers.

NOTE

The reference designations for the modules listed below are given for main receiver 1A3. For the diversity receiver, substitute 1A4 before the module reference designation as well as the reference designation appearing in the main paragraph title.

Reference designation	*Nomenclature*
1A3A1	IF bandpass filter (channel B1)
1A3A2	IF bandpass filter (channel B2)
1A3A3	IF hybrid network
1A3A4	IF bandpass filter (channel A1)
1A3A5	IF bandpass filter (channel A2)
1A3A8	Agc selector
1A3A9	IF amplifier (channel A1)
1A3A10	IF amplifier (channel B2)
1A3A11	IF amplifier (channel A2)
1A3A12	IF amplifier (channel B1)
1A3A15	Power supply
1A3A16	Vhf mixer
1A3A20	Hf mixer
1A3A21	Hf gain equalizer
1A3A25	Vhf filter bandpass
1A3A26	1.75-MHz hybrid network
1A3A29	Alarm monitor
1A3A35	Chassis assembly
1A3A35A1	Agc diode logic board
1A3A35A32	Low pass filter connector assembly
1A3A35A39	Tune interlock assembly
1A3A35A46	Filter and diode assembly
1A3A35A48	Filter assembly
1A3A35A49	Filter assembly
1A3FL1	Low pass filter
1A3A37	Preselector
1A3A37A1	Filter assembly
1A3A37A2	Servoamplifier assembly
1A3A37A3	Discriminator assembly
1A3A37A4	Gear train assembly
1A3A37Z1	Diode assembly
1A3A38	Low pass filter

2-15. Receiver Overall Block Diagram Description (fig. 7-9)

a. The receiver is an independent-sideband, triple conversion superheterodyne receiver capable of demodulating conventional amplitude-modulated or single-sideband, suppressed or reduced carrier signals. When receiving single sideband transmissions, the receiver can process up to four separate audio channels simultaneously. Four IF/audio channels are provided; each channel processes one group of signals. Channels A1 and B1 are the upper and lower inboard channels, respectively, and provide an audio output range of 250 to 3040 Hz. Channels A2 and B2 are the upper and lower outboard channels, respectively, and provide an audio output range of 350 to 3040 Hz. The overall bandpass of the receiver is approximately 12 kHz (fig. 2-4), with the upper and lower sidebands each occupying approximately 6 kHz. The center of operating frequency (fo), set at the synthesizer, is variable from 2 to 29,9999 MHz in 100-Hz increments. Channel A1 extends from 250 to 3040 Hz above fo, while channel B1 extends the same amount below fo. A guard band of 210 Hz is provided between the inboard and outboard channels to reduce adjacent channel interference. Channel A2 extends from 3250 to 5940 Hz above the fo while channel B2 extends the same amount below fo.

b. After the operating frequency for the receiving set has been selected at the synthesizer (local operation) or at the remote control unit (remote operation) a receiver tuning cycle is initiated.

2-16. Receiver Tune Cycle

a. A receiver tune cycle is initiated automatically when tune interlock circuit A35A39 receives a tune initiate signal from the synthesizer during local operation. If necessary the tune initiate signal can also be supplied manually by pressing the TUNE button on the receiver. When the receiver is in the remote operation the tune command is initiated from the control converter portion of the remote control subsystem. The tune interlock circuit also provides antenna relay commands to the antenna protector to disconnect the antenna from the receiver during the tune cycle.

b. The incoming signal is received by preselector A37. The primary purpose of the preselector is to accept the desired signal to which the receiver is tuned and reject all unwanted signals. The preselector is servo-tuned to any selected frequency, within approximately 8 seconds

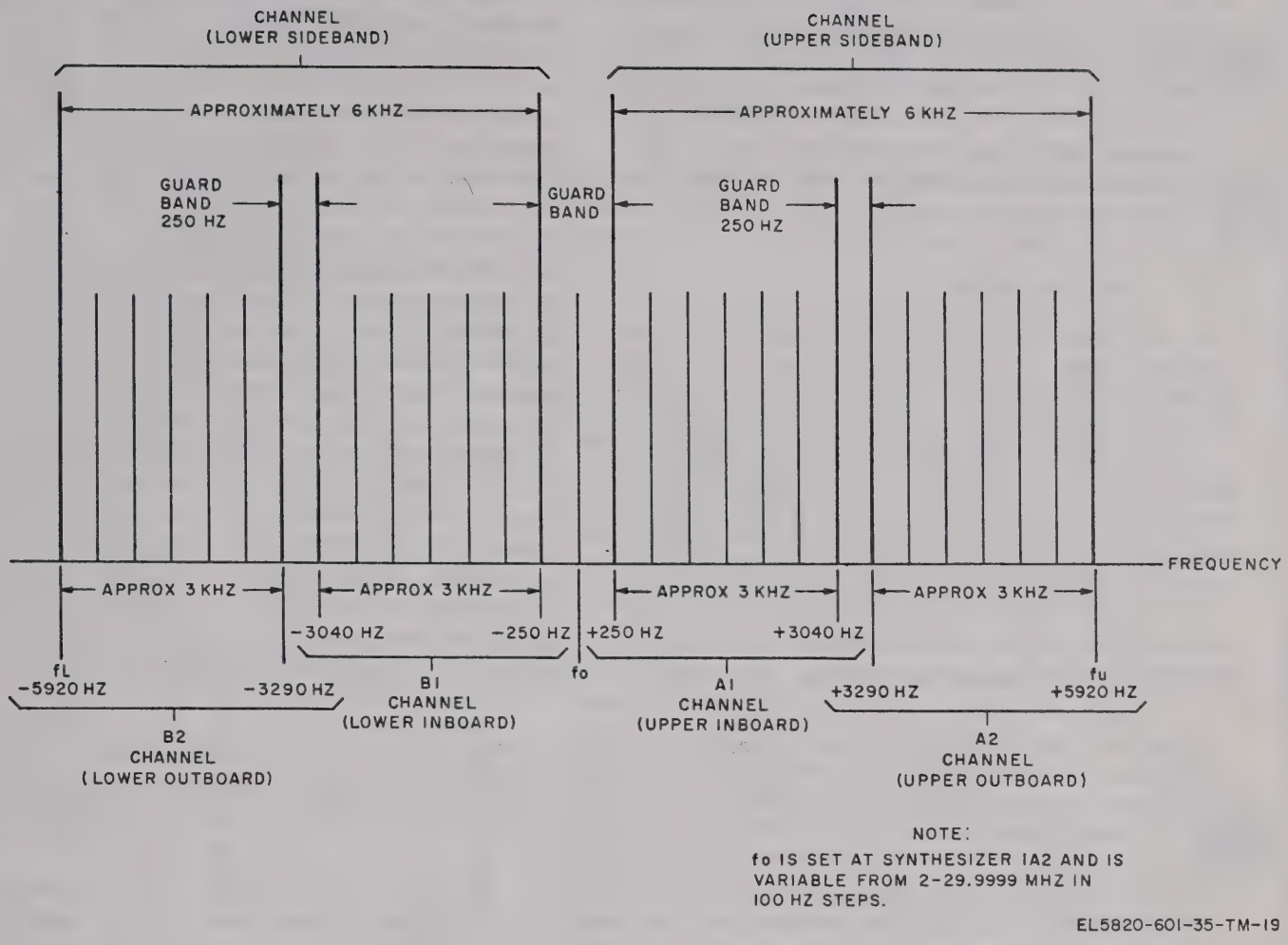

Figure 2-4. Receiver signal bandpass, diagram.

after receiving the tune command. The synthesizer supplies band information to the preselector and vhf bandpass filter A25. During the tune cycle the preselector provides an agc override signal to the hf gain equalizer A21. This action insures a constant level tuning signal by inhibiting hf agc action at all times during a tune cycle. Each tuneable bandpass filter section of the preselector is associated with a particular band of frequencies. Tuneable bandpass filter No. 1 covers 2 to 4.9999 MHz; tuneable bandpass filter No. 2 covers 4 to 11.9999 MHz; and tuneable bandpass filter No. 3 covers 12 to 29.9999 MHz.

c. The output of the preselector is connected to low pass filter A38. This filter has a frequency response which is flat (within 0.2 db) over the frequency range of 2 to 30 MHz. Signals above 30 MHz are sharply attenuated by the combined filter and preselector selectivity. The attenuation characteristic increases to approximately 100 db at 130 to 155 MHz, and 80 db at 300 MHz. Because of the upconversion scheme and the preselector, signals which fall outside the 2 to 29.9999 MHz receiver operating range are rejected, if frequency interference is virtually eliminated and oscillator radiation is kept to an absolute minimum.

d. Hf gain equalizer A21 provides continuously variable attenuation of the received signal from 6 to 50 db in the operating range of 2 to 29.9999 MHz at input levels in excess of 2 mv. The amount of attenuation this module provides is controlled by the magnitude of the 1.75-MHz agc signal developed by vhf mixer A16. When the level of the input signal to the receiver exceeds 2 mv (nominal), the hf gain equalizer is activated and the signal level to the succeeding stages is reduced proportionately to any increase in received signal above 3 mv. Below the 2 mv threshold level, the hf gain equalizer is main-

tained at 6 db attenuation down to an input level of 1 mv nominal at which point the attenuator is switched completely out of circuit by a relay. When the relay is restored, insertion loss is virtually zero. During the tune cycle the relay is prevented from operating by removing +18-volt supply to the relay line. This insures an adequate level tune reference signal.

2–17. Up-Conversion

a. Hf mixer A20 provides up conversion of the received signal to a 131.75, 141.75, or 151.75 MHz intermediate frequency depending upon the selected operating frequency band. The process of up conversion to vhf improves receiver performance by sharply reducing IF and image frequency interference susceptibility. When a frequency in the band (2 to 9.9999 MHz) is chosen, the intermediate frequency output of the hf mixer is 151.75 MHz. A (10 to 19.9999 MHz) frequency setting will produce 141.75 MHz, while a (20 to 29.9999 MHz) frequency setting will produce 131.75 MHz. The synthesizer supplies a variable frequency oscillator (vfo) injection frequency of 151.75 to 161.7499 MHz in 100-Hz increments to the hf mixer, where the incoming signal and vfo injection signals are heterodyned in a diode quad mixer stage. The resulting IF signal is amplified and fed to a relay-controlled vhf bandpass filter A25 which is tuned to pass 131.75, 141.75, or 151.75 MHz in accordance with the selected frequency band. Relay ground closures for selection of the appropriate filters are supplied by the synthesizer. The table provided below lists receiver operating frequencies in steps and shows corresponding injection frequencies and band information supplied by the synthesizer to produce the 131.75, 141.75, or 151.75 MHz IF, output of the hf mixer. The injection frequencies listed are applicable to operation without automatic frequency control. When the automatic frequency control is activated, the vfo frequency will vary in accordance with the amount of correction needed to retune the receiver to a carrier that is not exactly tuned to an assigned frequency.

Operating frequency (MHz)	Antenna band (preselector)	Lo band (VHF filter)	Synthesizer frequency Vfo	Injection (MHz) Lo	Composite band	1st IF MHz
2	1	A	153.75	150	1A	
3	1	A	154.75	150	1A	
4.9999	1	A	156.7499	150	1A	
5	2	A	156.75	150	2A	
6	2	A	157.75	150	2A	151.75
7	2	A	158.75	150	2A	
8	2	A	159.75	150	2A	
9	2	A	160.75	150	2A	
9.9999	2	A	161.7499	150	2A	
10	2	B	151.75	140	2B	
11.9999	2	B	153.7499	140	2B	
12	3	B	153.75	140	3B	
13	3	B	154.75	140	3B	
14	3	B	155.75	140	3B	
15	3	B	156.75	140	3B	141.75
16	3	B	157.75	140	3B	
17	3	B	158.75	140	3B	
18	3	B	159.75	140	3B	
19	3	B	160.75	140	3B	
19.9999	3	B	161.7499	140	3B	141.75
20	3	C	151.75	130	3C	
21	3	C	152.75	130	3C	
22	3	C	153.75	130	3C	
23	3	C	154.75	130	3C	
24	3	C	155.75	130	3C	
25	3	C	156.75	130	3C	131.75
26	3	C	157.75	130	3C	
27	3	C	158.75	130	3C	
28	3	C	159.75	130	3C	
29	3	C	160.75	130	3C	
29.9999	3	C	161.7499	130	3C	

b. The IF output signal of the hf mixer is fed to bandpass filter A25. The bandpass filter consists of three individual filter assemblies, each tuned to one of the three IF outputs provided by the hf mixer. Only one bandpass filter at a time is switched into operation. The 131.75-, 141.75-, or 151.75-MHz filter is selected by a relay switching circuit which is activated by relay ground closure commands supplied by the synthesizer. Each filter assembly has a 3-db passband of approximately 500 kHz. Output of the bandpass filter is routed to the vhf mixer A16.

2–18. Down-Conversion

a. Down-conversion to a second intermediate frequency of 1.75 MHz is accomplished in vhf mixer A16. The input signal at 131.75, 141.75, or 151.75 MHz is heterodyned with the lo signal 130, 140, or 150 MHz, respectively, to produce 1.75 MHz. An output from the vhf mixer at this frequency is also fed back to the hf gain equalizer as an agc control signal. This second IF signal comprises a carrier at 1.75 MHz with upper and lower sidebands extending approximately 6 kHz on either side of the carrier.

b. The 1.75-MHz signal is applied to IF hybrid network A3. This network develops four identical but isolated 1.75-MHz output signals plus one output which supplies carrier signals to the automatic frequency control. The four identical outputs are applied to bandpass filter A1, A2, A4, and A5. These bandpass filters are sharp cutoff, high-Q crystal lattice networks. Each network is designed to pass a specific band of frequencies. The ability of each filter to reject all frequencies that fall outside its passband is important in the isolation of the four individual IF information channels. The passband characteristics of each bandpass filter are shown in figure 2–5. Included in this illustration is a composite view of the IF signal showing the relationship between the 1.75-MHz suppressed carrier and the sideband frequencies of each channel as they appear in the frequency spectrum. Because of sideband inversion due to the conversion scheme channels A1 and A2 are now located below fo and channels B1 and B2 are located above fo.

c. If amplifiers A9 through A12 provide amplification and demodulation for the four filtered input channels. The injection frequencies of 1.756290 MHz and 1.743710 MHz are supplied from the synthesizer to channel B2 IF amplifier A10 and channel A2 IF amplifier A11, respectively. The 1.75-MHz injection frequency is supplied to hybrid network A26 where the signal is divided into two isolated signals for similar carrier injection to channels A1 IF amplifier A9 and B1 IF amplifier A12. The four IF amplifiers are identical. The input IF intelligence is amplified by two cascaded amplifiers, and fed to a diode

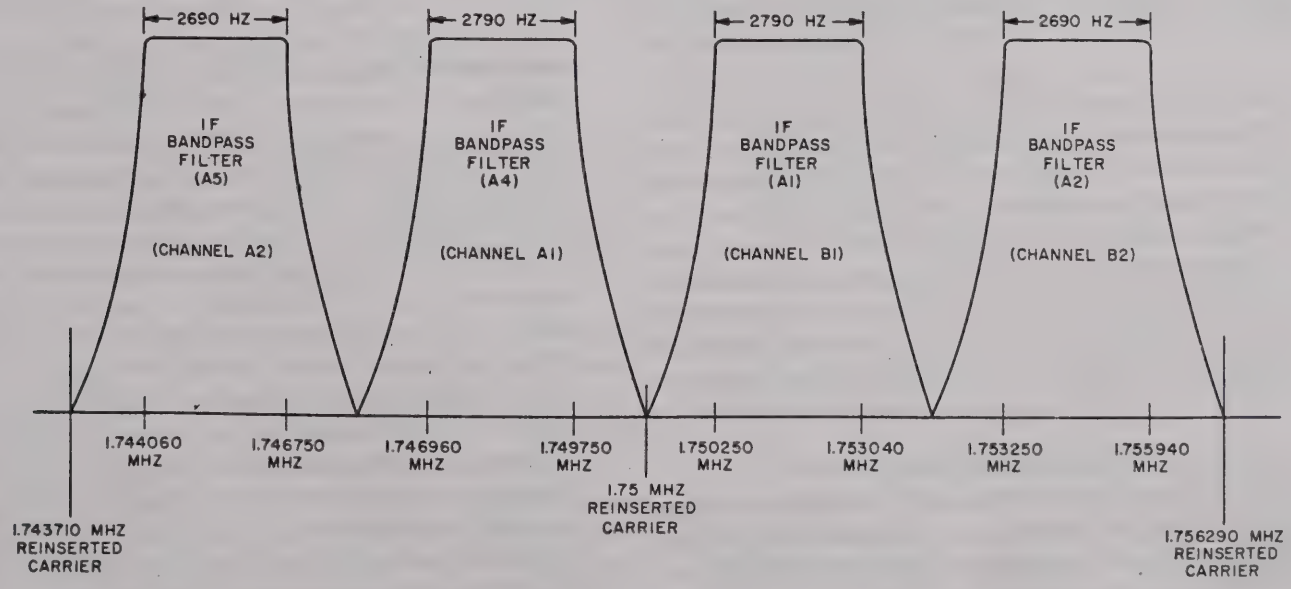

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Figure 2–5. Bandpass filter characteristics.

quad demodulator in conjunction with the appropriate carrier injection signal from the synthesizer. The difference frequency output corresponds to the transmitted audio for the respective channel. The bandwidth of the inboard channels (A1 and B1) is approximately 2790 Hz at 1 db. The bandwidth of the outboard channels (A2 and B2) is approximately 2690 Hz at 1 db. IF amplifiers A9 through A12 also contain two agc time constant circuits which operate in conjunction with agc selector A8. Four possible time constants exist. These are short time constant (vfct), long time constant (voice), medium time constant (data) and optional time constant which can be introduced for any other purpose. The time constants are selected at the front panel of the main receiver using the OPERATING MODE switches during local operation and from the remote control unit during remote operation. The time constants commands are applied to agc selector A8 which provides relay closures to place the selected time constants into the IF amplifier agc circuits. Agc selector A8 also drives panel mounted indicator lamps A35A2A41 through A35A2A44 on the main and diversity receivers to indicate which time constant has been selected. This module also contains the time constant determining components for the data and spare time constant positions.

d. Associated with the agc selector is agc diode logic board A35A1. Time constant relay commands received from the agc selector light the appropriate OPERATING MODE indicator lamps through the lamp test gating diode logic circuits.

e. The output of each IF amplifier is fed to a matching transformer (A35T1 through A35T4). These transformers provide impedance matching between the IF amplifier and the delay equalizers in the audio monitor. They also transform the unbalanced 51-ohm output of the IF amplifiers into a balanced output at 600 ohms. An attenuator is provided at the output of each audio channel. The attenuators can be set to vary the audio output level between approximately −3 and −40 dbm.

2–19. Monitoring Functions

a. The alarm monitor A29 provides a means for monitoring certain control functions, supply voltages, and for testing all the front panel indicator lamps at one time.

b. The circuit test switch A35A2A1S5, provides a means of visually monitoring the critical signals within the receiver.

2–20. Power Supply and Filtering

a. Power supply A15 provides +18 volts and −18 volts regulated dc power to the receiver for circuit operations.

b. Connector, low pass command filter, assembly A35A32 provides for attenuation of all frequencies below 2 MHz, which may have been induced into the command lines to connector J7.

2–21. Receiver Tune Cycle Detailed Block Diagram Description

The receiving set is capable of automatically tuning to the frequency selected by the local or remote operator. However, if the main or diversity receivers fail to lock to the selected frequency for any reason (as evidenced by a TUNE-FAULT lamp indication), a manual means is provided for reinitiating the tune cycle. A block diagram analysis of each follows. Refer to figure 7–10.

a. Automatic Tune Cycle. The automatic (normal) tune cycle is initiated whenever a tune pulse is received from the synthesizer via the tune interlock circuit A35A39 while in local operation or from the control converter in remote operation. A tune cycle is also initiated when REMOTE–LOCAL switch is changed from the LOCAL to REMOTE position or vice versa. Since the tuning process for both conditions are essentially the same except for minor differences (refer to paragraph 2–25 for details) only the tune cycle initiated by the synthesizer will be discussed here. If no faults exists, the tune interlock circuit issues a tune command signal to energize a tune relay in the discriminator portion of the preselector A37. This action energizes another tune relay in the filter section of the preselector which causes the antenna input to the preselector to be disconnected and substitutes a tuned oscillator (p/o preselector). Simultaneously, band information selecting either band 1 (2 to 4.9999 MHz, band 2 (5 to 11.9999 MHz) or band 3 (12 to 29.9999 MHz) is received from the synthesizer. The appropriate tuneable filter assembly is selected which now operates with the oscillator portion to generate a frequency tuned between the limits of the band selected. Simultaneously the preselector servosystem is energized and the servomotor drives the tuning capacitors to scan the oscillator across the selected band. The preselector servo is now in a coarse tune condition. Assuming that a 3-MHz signal has been selected by the local operator, the synthesizer will provide a 154.75-MHz signal

to hf mixer A20. The resulting output from the mixer will vary from 149.75 MHz to 152.75 while the preselector output varies from 2 to 4.9999 MHz. Band information from the synthesizer has selected the 151.75-MHz bandpass filter section of the vhf bandpass filter A25. The vhf bandpass filter permits signals from 151.5 to 161.25 MHz to pass and sharply attenuates all others. The A25 filter output is combined in the vhf mixer A16 with the 150 MHz lo injection signal. The resulting signal of 1.75 MHz (151.75–150 MHz) is fed back to the oscillator portion of the preselector. This is detected by a level sensitive circuit which operates a relay to connect the 1.75-MHz signal to the discriminator circuit which is set for a null output at 1.75 MHz. The output from the discriminator is amplified to fine tune the servo motor to achieve a null output at which point the tune cycle is complete. The tuneable filter for band 1 is now set to receive an incoming signal at the frequency selected by the synthesizer. The oscillator is disconnected from the tuneable filter, and the antenna is reconnected to the input of the preselector.

b. Manual Tune Cycle. The manual tune cycle is identical to the automatic tuning proces except that it is initiated by the local operator selecting a desired frequency at the synthesizer or by depressing the TUNE button on the main receiver front panel while in local operation. The TUNE button is normally used only for test purposes.

2–22. Receiver Summary and Status Loops (fig. 7–11)

The receiver group employs three interlocking loops as a means of determining component status; summary fault, ready interlock, and remote/local status. Each loop is discussed in detail in the following subparagraphs.

a. Summary Fault Loop. The summary fault loop is a continuous return to ground between the components. A malfunction in any one component will interrupt this return loop. The loss of ground at pin CH of the control converter connector causes a fault signal to be transmitted to the remote control unit at the remote location. This in turn lights the RCVR fault indicator to alert the remote operator to the fact that a fault condition exists. The fault indicator will also light on the appropriate components of the receiver system to provide the local operator with a starting point in localizing the trouble. In the STANDBY mode, power is removed from the synthesizer, automatic frequency control, and the main and diversity receivers. In order to prevent an erroneous fault indication at the remote control unit during standby, an inhibit circuit provides a ground via contacts of relay 1A6K1 on the summary fault loop at the audio monitor level. In standby condition the fault detection system is still active for the remote control unit and audio monitor components which have active circuits during standby.

b. Ready Interlock Loop. The ready interlock loop is a continuous ground return loop circuit which passes from the control converter pin CS through the main and diversity receivers to the summary fault loop and then to ground. Completion of this loop is an indication that the following conditions have been met within the system:

(1) No fault condition exists.

(2) Local/Remote control is set to REMOTE.

(3) MANUAL GAIN/AGC switches on the receivers are all set to AGC.

(4) No tuning fault condition exists, i.e., preselectors tuned to an assigned frequency, bands properly selected. The receiver system is now ready to operate at the assigned (remotely selected) frequency. This ground condition is sensed at pin CS of the control converter connector and a ready command is transmitted to the remote control unit where it causes the READY lamp to light.

NOTE

The ready indication is not directly associated with agc time constant selection which may be varied at any time without interrupting the ready status.

Changing frequency at the remote control unit causes the ready status to be interrupted during the tune cycle and the READY lamp will remain extinguished until the tune cycle is complete at which time it will light again.

c. Remote/Local Status Loop. The remote/local status loop is a continuous ground loop which passes through the LOCAL/REMOTE switch contacts on the main and diversity receiver. When both switches are set to REMOTE, the link is completed and a ground is sensed at pin BP of the control converter. An available command is transmitted to the remote control unit which cancels the override condition and illum-

inates the AVAILABLE lamp to alert the remote operator that the system is now available for remote control. If the receiver REMOTE/CONTROL switch is set to LOCAL, ground is removed from pin BP of the control converter connector. This is sensed and an override command is transmitted to the remote control unit. This cancels the available status and illuminates the OVERRIDE lamp, alerting the operator to the fact that the remote control unit has been overridden by the local operator.

2–23. Functional Circuit Analysis

The main and diversity receivers consist of the modules shown in figure 7–8. Paragraphs 2–24 through 2–40 provide detailed circuit analysis of these modules. The order of discussion is for the most part by functional flow as indicated in figure 7–9.

2–24. Preselector A37
(fig. 7–12)

The preselector consists of three tuneable bandpass filters A37A1, antenna protector diode isolator assembly A37Z1, a discriminator A37A3, a servo drive circuit A37A2 (operating in conjunction with a gear train) which is used to tune (drive) the tuneable bandpass filters, associated relay logic circuits and discriminator circuit. During receiver operation, one of three bandpass filters is selected automatically by the synthesizer depending upon the frequency band to which the synthesizer is set. These bands are identified as follows:

Band 1—2 to 4.9999 MHz
Band 2—5 to 11.9999 MHz
Band 3—12 to 29.9999 MHz

a. A tuning cycle is initiated when a tune command signal is received from the tune interlock circuit A35A39. The tune command is initiated by the control converter in remote operation or by the synthesizer frequency change, REMOTE/LOCAL switch change or the TUNE press button switch in the local operation. This command provides a ground closure for tune relay A1A3K2 in preselector A37. Figure 7–13 is a functional schematic of the tune cycle. The TUNE switch on the diversity receiver 1A4 has no effect since the diversity receiver is controlled by the TUNE switch on the main receiver 1A3. During the tune cycle, relay A37A1A3K2 operates to connect the +18 vdc power to the various circuits of the preselector. The +18 vdc is applied to a tune fault circuit (discussed later), high-gain servoamplifier A37A1A2 ARI and to energize filter-oscillator relay A37A1A2K6 and tune relay A37A1A2K7. Closure of relay A37A1A2K6 operates filter-oscillator relay A37A1A1K2, disconnecting the antenna input to the preselector circuits. The antenna input is replaced by a limiter-amplifier (oscillator) circuit, part of A37A3. The +18 vdc received from operated A37A1A3K2 plus the voltage at A2Q3, Q4 emitters turns on transistor A37A1A2Q5. Transistor A37A2Q6 cuts off, A37A2Q7 saturates, and in turn energizes latching relay A37A1A2K8. This action provides a tune hold signal (ground) to tune relay A37A1A3K2 previously supplied from the tune interlock circuit A35A39, locking up the relay. As shown if a tune fault exists evidenced by failure of the preselector to tune in 20 seconds, the unijunction transistor A39A1A3Q6 will fire SCR A39A1A3Q7 thereby energizing relay A37A1A3K3, removing the tune hold signal and will also light the TUNE indicator and FAULT indicator lamps.

b. The tuneable bandpass filters for band 1, 2, or 3 are selected by means of band information (ground closures) supplied to the preselector by the synthesizer. *For example,* when the synthesizer is set to a frequency in band 2, ground is connected to relays in the preselector that select tuneable bandpass filter No. 2. The same applies to band 3. In the restored position, the relays connect bandpass filter No. 1.

c. The output of the selected tuneable filter (which is being driven by the servosystem, discussed later) is fed to low pass filter A38. The output of the band 1 filter (2 to 4.9999 MHz) when selected is fed through contacts 6–8 (A37A1A2K4 restored) to A38, the output of band 2 filter (5 to 11.9999 MHz) when selected is fed through contacts 6–8 (A37A1A2K5 restored) and contacts 6–1 (A37A1A2K4 operated), the output of band 3 (12 to 29.9999 MHz) when selected is fed through contacts 1–8 (A37A1A2K5 operated) and contacts 6–1 (A37A1A2K4 operated). The +18 vdc distribution previously mentioned energizes relay A37A1A2K7, which supplies sufficient error voltage to unbalance servoamplifier A37A1A2Q3 and Q4 and start dc servomotor A37A1A4B1. Motor A37A1A4B1 is coupled through gearing to turn the tuneable filter capacitors.

d. As discussed in the block diagram analysis (para 2–21) the vhf mixer A16 applies the 1.75-

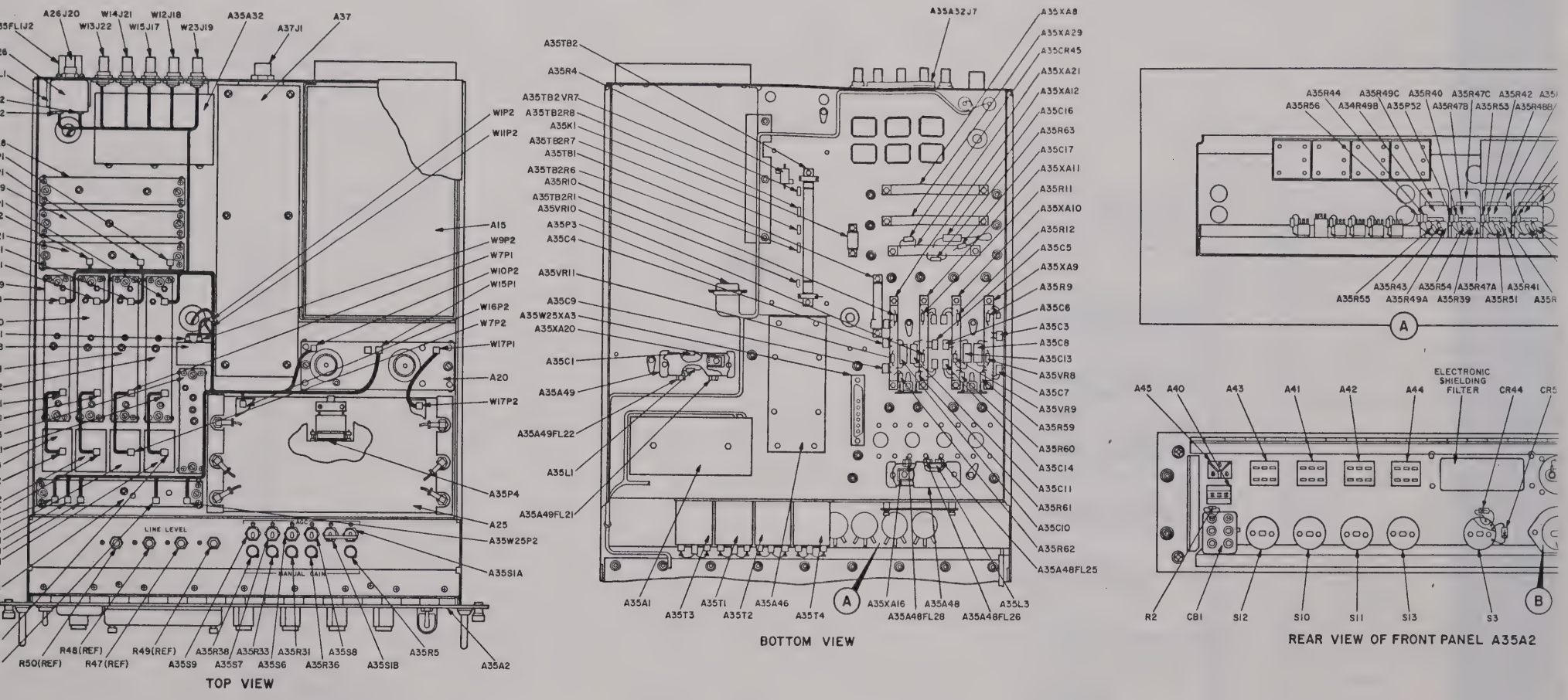

Figure 7-97. Main receiver 1A3 and diversity receiver 1A4, parts location diagram.

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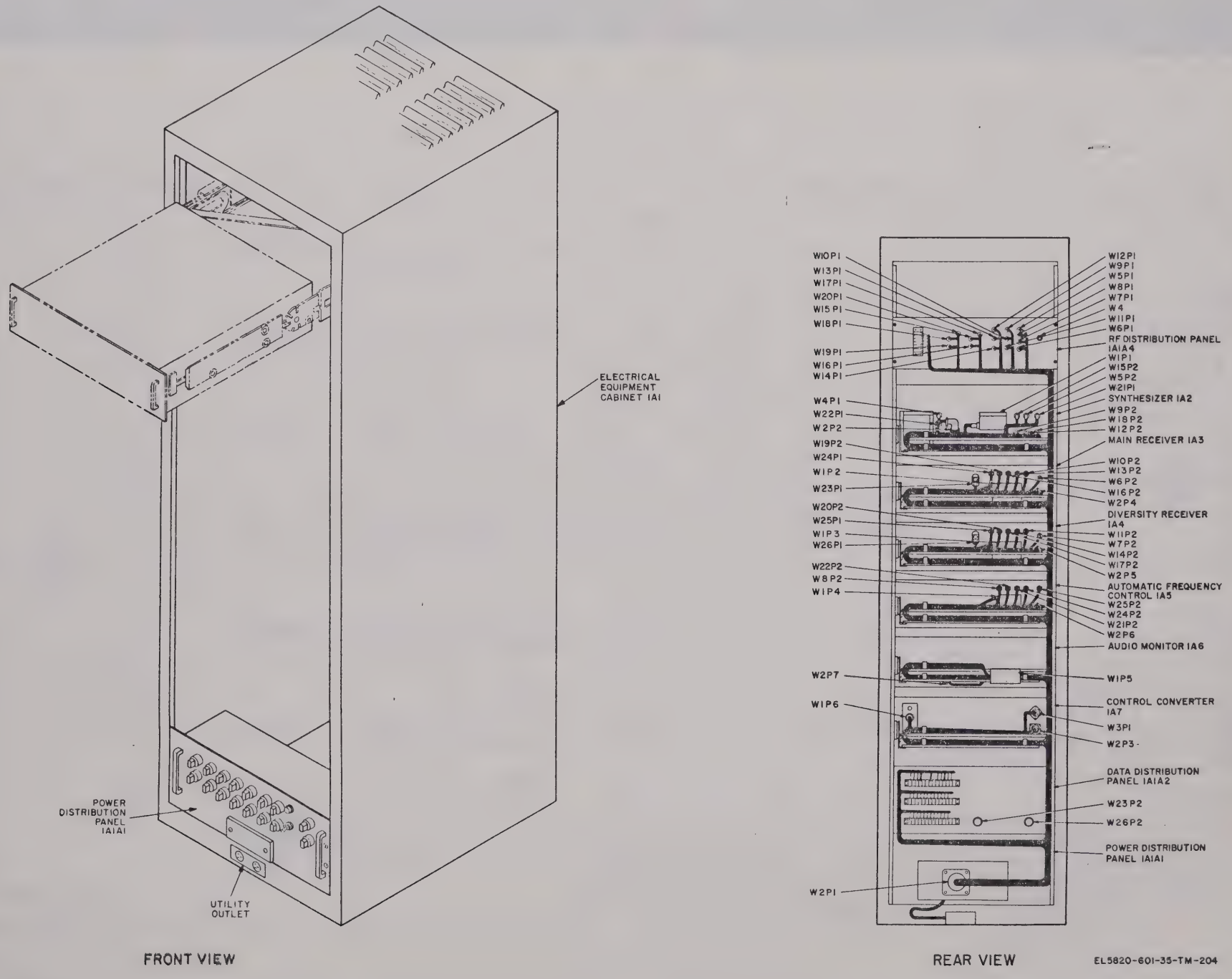

Figure 7-96. Electrical equipment cabinet 1A1, parts location diagram.

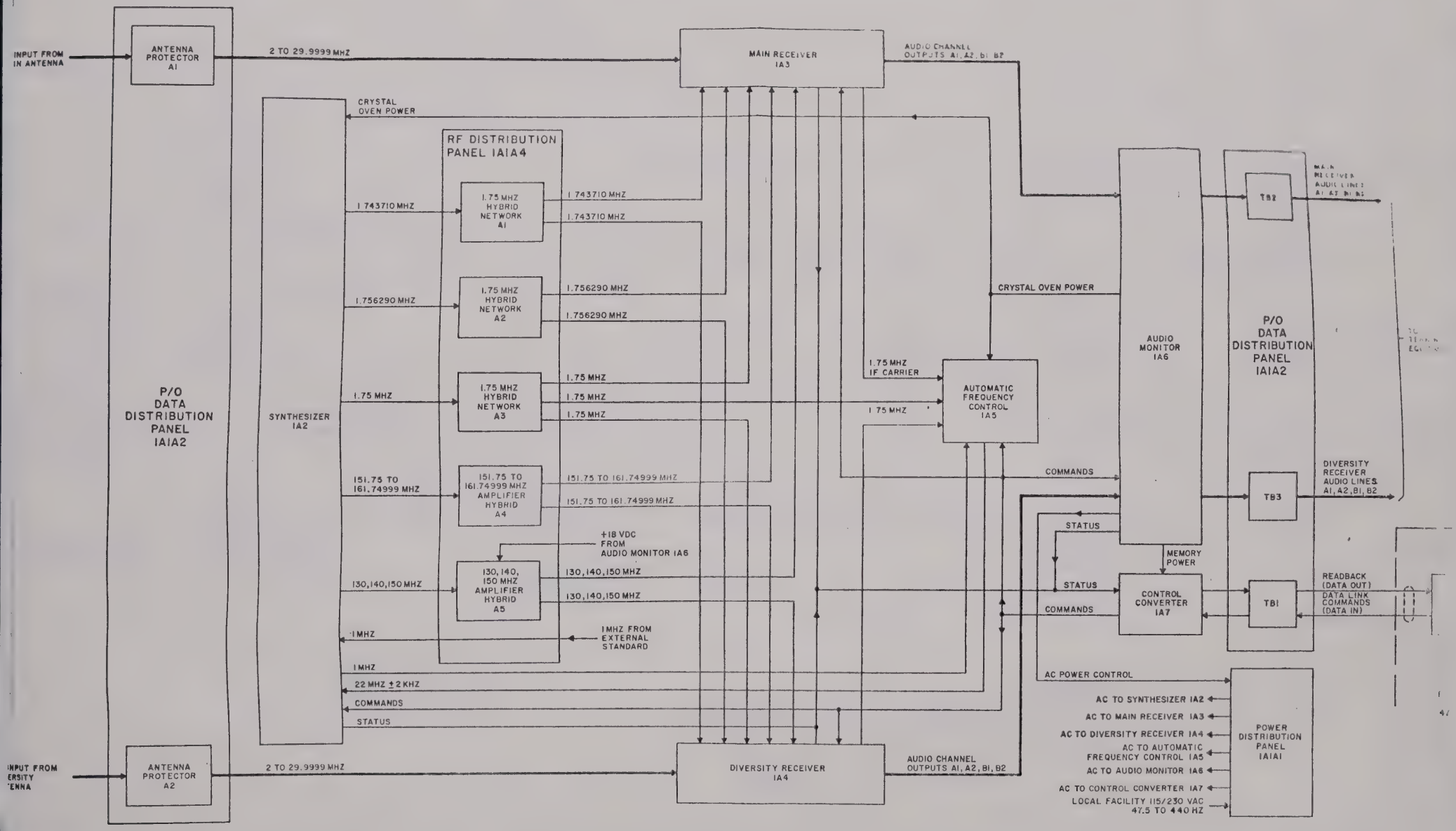

Figure 7-2. Receiving set FRR-79, block diagram.

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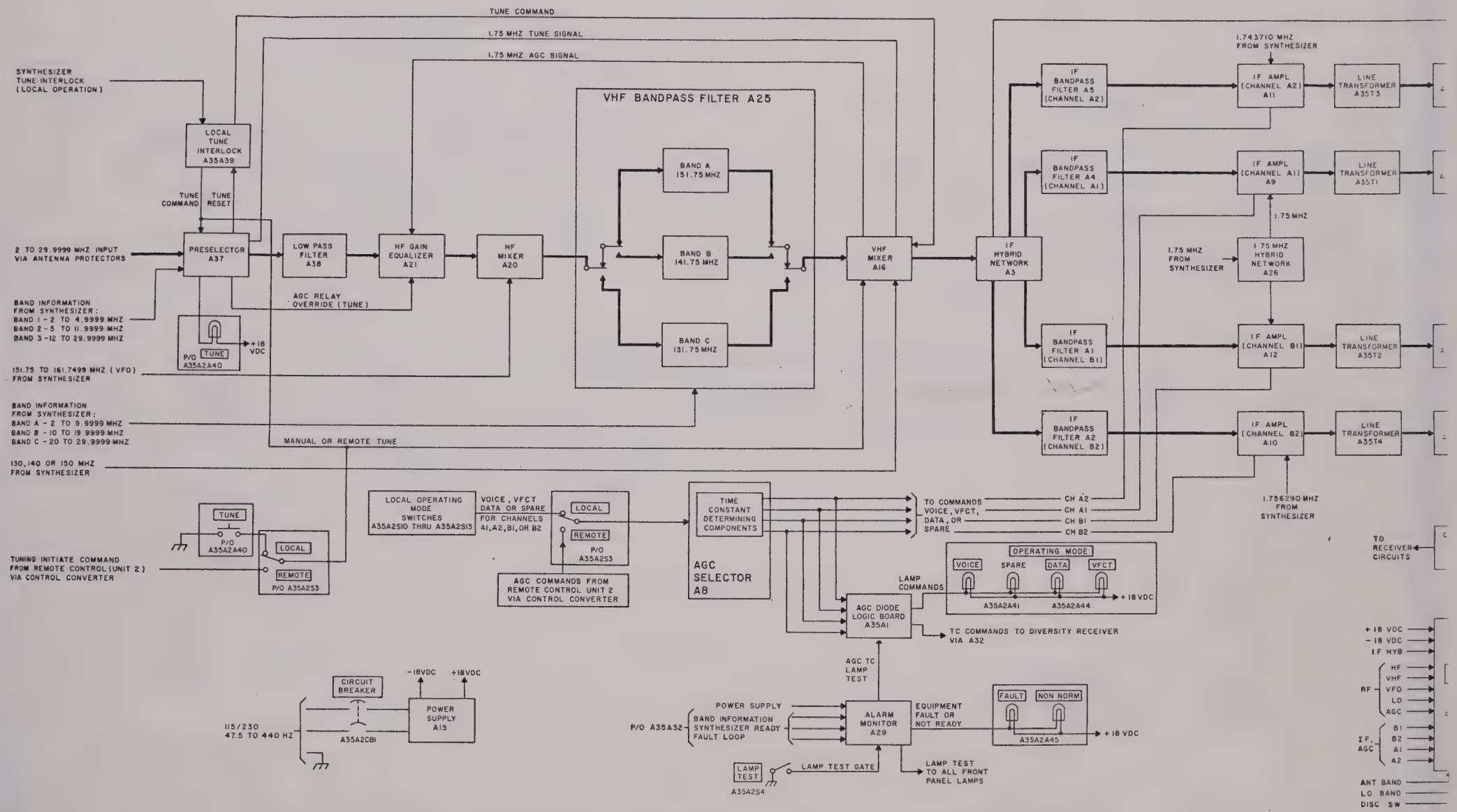

Figure 7-9. Main receiver 1A3 and diversity receiver 1A4, block diagram.

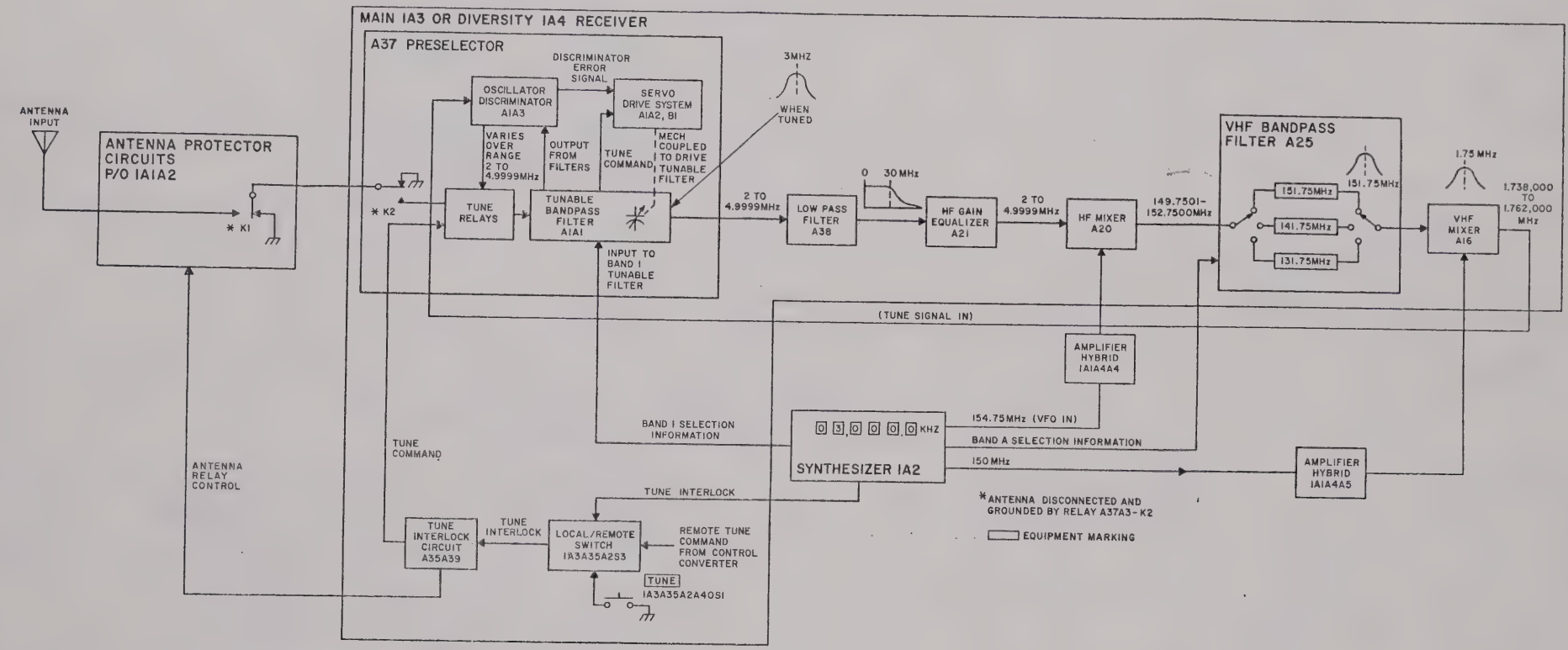

Figure 7-10. Receiver tune cycle, block diagram.

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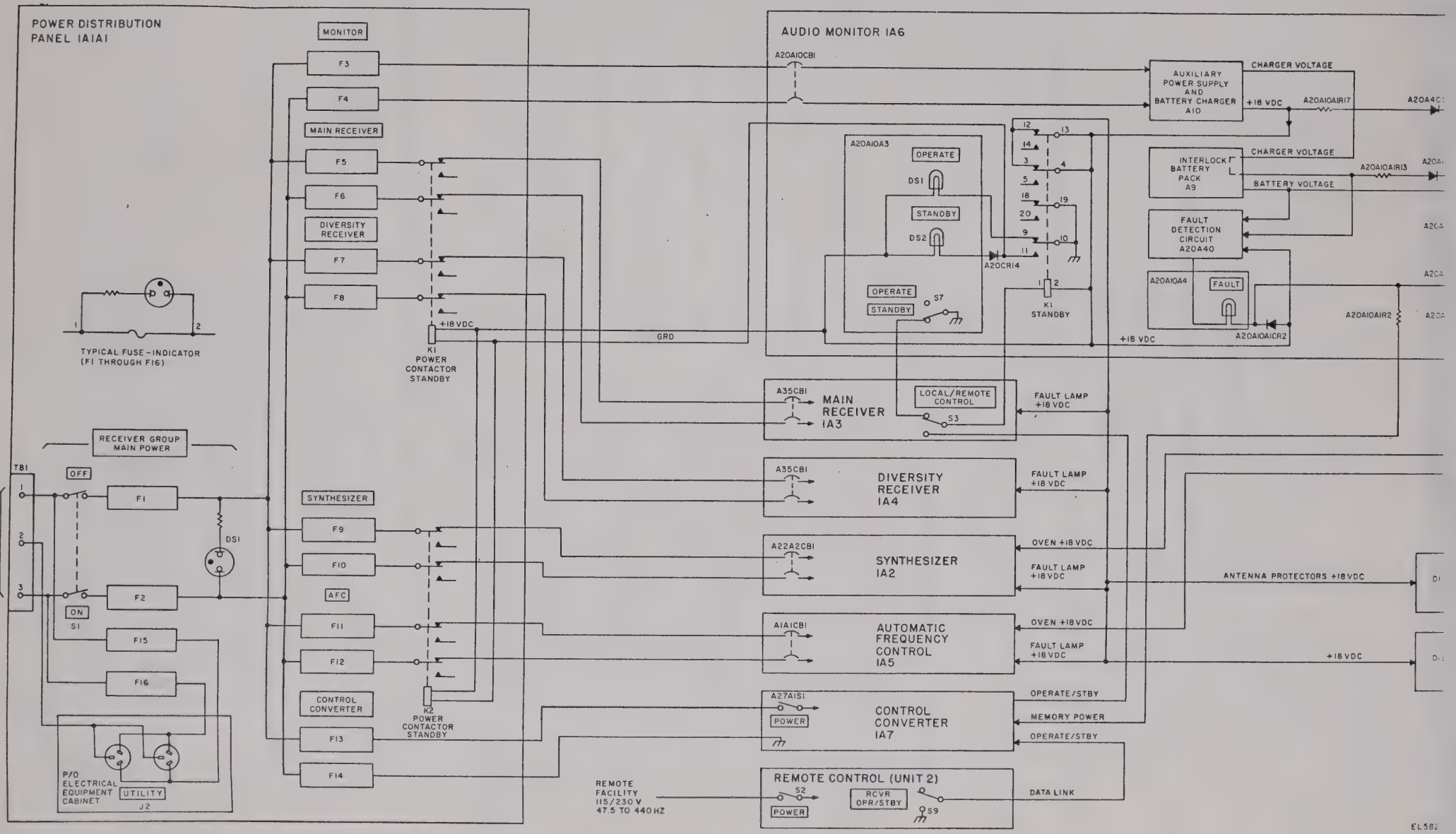

Figure 7-74. Receiver group AC power distribution and DC standby power, block diagram.

CHAPTER 5

ORGANIZATIONAL MAINTENANCE

Section I. GENERAL

5-1. Scope of Organizational Maintenance

a. This chapter contains instructions covering organizational maintenance procedures for Receiving Set, Radio AN/FRR-79 which are performed in addition to the operator's preventive maintenance (para 4-1 through 4-11).

b. Organizational maintenance consists of the following:

(1) Monthly preventive maintenance checks and services (para 5-3 and 5-4).

(2) Quarterly preventive maintenance checks and services (para 5-5 and 5-6).

(3) Troubleshooting (para 5-12, 5-13, and 5-14).

(4) Battery pack inspection and testing (para 5-11).

(5) Replacement of spare fuses and lamps.

5-2. Tools, Materials, and Test Equipment Required

The tools, materials, and test equipment required for organizational maintenance are as follows:

a. Tools. Tool Kit, Radio Repair TK-115/G.

b. Materials.

(1) Cleaning Compound (FSN 7930-395-9542).

(2) Cleaning cloth (FSN 8305-267-3015).

c. Test Equipment. None.

5-3. Organizational Monthly Preventive Maintenance

Perform the maintenance checks and services listed in the organizational monthly preventive maintenance checks and services chart (para 5-4) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance checks and services performed on it. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance. All deficiencies or shortcomings will be recorded in accordance with the requirements of TM 38-750.

5-4. Organizational Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	*Item to be inspected*	*Procedure*	*References*
1	Audio monitor battery pack	Partially withdrawn audio monitor from electrical equipment cabinet. Perform the battery inspection and testing procedure.	Paragraph 5-11.
2	Cables and connectors	Open rear door of electrical equipment cabinet and inspect all interconnecting cables, connectors, and wiring harness for signs of deterioration, chafing, or excessive strain.	Refer to higher category maintenance.
3	Component mounting slides	Slide out each receiver group component in electrical equipment cabinet. Slides should operate smoothly without excessive noise or binding.	Refer to higher category maintenance.
4	Air filters	Check to see that all air filters are in	Paragraph 4-7*e*.

Sequence No.	Item to be inspected	Procedure	References
		place and clean. Replace and/or clean air filters as necessary.	
5	Main or diversity receiver preselector sensitivity. *Note.* This precedure is to be used to maintain main or diversity receiver sensitivity.	*a.* Perform the local operating procedure and establish that the main or diversity receiver will tune at some frequency between 2 and 4.999 MHz. *b.* Depress the TUNE switch for 15 seconds at the frequency selected. *c.* Repeat steps *a* and *b* above at a frequency between 5 and 11.999 MHz. *d.* Repeat steps *a* and *b* above at a frequency between 12 and 29.999 MHz.	Paragraph 3–12.

5–5. Organizational Quarterly Preventive Maintenance

Quarterly preventive maintenance check and services are required on the AN/FRT–79. The monthly checks and services (para 5–4) constitute a part of the quarterly maintenance and must be performed concurrently. Record all deficiencies in accordance with the requirements of TM 38–750.

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing equipment operation. All of the checks and services should be performed only when the equipment is shut down.

5–6. Organizational Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Completeness	Check to see that equipment is complete	Appendix B.
2	Installation	Check to see that equipment is properly installed.	Paragraph 2–9.
3	Preservation	Check all surfaces for evidence of fungus. Remove rust and corrosion and spot-paint bare spots.	Paragraph 4–7.
4	Publications	Check to see that all publications are complete, serviceable, and current.	DA Pam 310–4.
5	Modifications	Check DA Pam 310–7 to determine if new applicable MWO's have been published. ALL URGENT MWO's must be applied immediately. ALL ROUTINE MWO's must be scheduled. washers are correctly tightened. Check	TM 38–750, DA Pam 310–7.
6	Mounting	Check to see that all bolts, nuts, and washers are correctly tightened. Check for cracked, bent, or broken slides and retractors.	Refer to higher category maintenance.
7	Cable harnesses and retractors	Open rear door of electrical equipment cabinet and check to see that cable harnesses are properly bound and clamped in place. Check cable insulation for cracking, fraying, or other evidence of damage. Check to see that cable retractors, work smoothly without binding.	Refer to higher category maintenance.
8	Component top and bottom covers	Individually pull out each component on electrical equipment cabinet and check its top and bottom covers. Covers should be mounted securely.	Refer to higher category maintenance.

Sequence No.	Item to be inspected	Procedure	References
9	Visual inspection	Inspect all receiver group components, assemblies, and parts for evidence of damage or deterioration. Check for blackened resistors, charred insulation, leaky electrolytic capacitors, etc. Replace all damaged or deteriorated assemblies and parts.	Refer to higher category maintenance.
10	Starting procedure	Perform starting procedure	Paragraphs 3–10 and 3–11.
11	Local operating procedure	Perform local operating procedure	Paragraph 3–12.
12	Remote operating procedure	Perform remote operating procedure	Paragraph 3–13 and 3–14.
13	Synthesizer circuit tests	Perform synthesizer circuit tests using CIRCUIT TEST switch and CIRCUIT TEST meter.	Paragraph 5–7.
14	Main and diversity receiver circuit tests.	Perform main and diversity receiver circuit tests using respective CIRCUIT TEST switch and CIRCUIT TEST meter.	Paragraph 5–8.
15	Automatic frequency control tests	Perform automatic frequency control circuit tests using CIRCUIT TEST switch and CIRCUIT TEST meter.	Paragraph 5–9.
16	Audio monitor circuit tests	Perform audio monitor circuit tests using CIRCUIT TEST switch and CIRCUIT TEST meter.	Paragraph 5–10.
17	Battery pack	Perform battery pack inspection and testing.	Paragraph 5–11.
18	Spare parts	Check all spare parts (operator and organizational) for general condition and method of storage. There should be no evidence of overstock, and all shortages must be on valid requisitions.	Appendix B.

5–7. Synthesizer Circuit Tests

To perform synthesizer circuit tests, set the CIRCUIT TEST switch to OFF; then rotate the CIRCUIT TEST switch clockwise to each position listed in the chart below and note whether the CIRCUIT TEST meter indication obtained differs from that listed in the chart. If a meter indication is out of tolerance, refer to a higher category of maintenance.

CIRCUIT TEST switch position	*CIRCUIT TEST meter indication*
BAT	Green area
+ 18V	50 ± 6
− 9V	50 ± 6
STD	50 ± 10
2.3 MHz	20 min.
23 MHz	20 min.
0.1 KHzΔ	20 min.
1 KHzΔ	20 min.
10 KHzΔ	20 min.
22 MHz	20 min.
4.75 MHz	20 min.
100 KHz	20 min.
CONV-VHF	20 min.
1 MHzΔ	20 min.
10 MHzΔ	20 min.
BAND INFO	50 ± 10
OUTPUT	20 min.
1.75 MHz	30 to 80
2.9 MHz	50 ± 20
1.74371 MHz	50 ± 20
1.75629 MHz	50 ±20
Blank	—
CAL	Set to 10X

5–8. R–1534/FRR–79 Circuit Tests

To perform main or diversity receiver circuit tests, set the CIRCUIT TEST switch to OFF, then rotate the CIRCUIT TEST switch clockwise to each position listed in chart below and note whether the CIRCUIT TEST meter indication obtained differs from that listed in the chart. If a meter indication is out of tolerance, refer to a higher category of maintenance.

CIRCUIT TEST switch position	*CIRCUIT TEST meter indication*
+ 18V	50 ± 6
− 18V	50 ± 6
IF HYB	Green area
RF HF	Green area (typ) to 90 (max)
RF VHF	Green area
RF VFO	Green area
RF LO	Green area
RF AGC	0 (no signal)
B2 IF	Green area
B2 AGC	0 to 20 (no signal)
	0 to 70 (signal)

CIRCUIT TEST switch position	*CIRCUIT TEST meter indication*
B1 IF	Green area
B1 AGC	0 to 20 (no signal) 0 to 70 (signal)
A1 IF	Green area
A1 AGC	0 to 20 (no signal) 0 to 70 (signal)
A2 IF	Green area
A2 AGC	0 to 20 (no signal) 0 to 70 (signal)

Note. Wait 30 seconds for reading to stabilize in the following tests.

ANT BAND	10 ± 4 (synthesizer 2 to 4.9999 MHz). 20 ± 4 (synthesizer 5 to 11.9999 MHz). 30 ± 4 (synthesizer 12 to 29.9999 MHz).
LO BAND	10 ± 4 (synthesizer 2 to 9.9999 MHz). 20 ± 4 (synthesizer 10 to 19.9999 MHz). 30 ± 4 (synthesizer 20 to 29.9999 MHz).
DISC SW	Momentary meter deflection during time cycle.

5-9. Automatic Frequency Control Circuit Tests

To perform automatic frequency control circuit tests, set the CIRCUIT TEST switch to OFF; then rotate the CIRCUIT TEST switch clockwise to each position listed in chart below and note whether the CIRCUIT TEST meter indication obtained differs from that listed in the chart. If a meter indication is out of tolerance, refer to a higher category of maintenance repair.

NOTE

The meter indications listed are for no-received-signal condition only.

CIRCUIT TEST switch position	*CIRCUIT TEST meter indication*
CARRIER	Random (40 maximum)
OVEN	Green area
1.MHz PH DET	To random
VCO BIAS	Green area
LOCAL DET	Random (40 maximum)
LOCAL OSC	Green area
IF AMPL	Green area
1 MHz	Green area
21 MHz	Green area
22 MHz	Green area
1.75 MHz	Green area
− 18 V	50 ± 6
+ 18 V	50 ± 6
+ 18 V STDBY	Green area
SERVO DRIVER	Green area
DET RELAY	Green area
RESET RELAY	Green area
TIMER RELAY	0
MEMORY RELAY	0

5-10. Audio Monitor Circuit Tests

To perform audio monitor circuit tests, set the CIRCUIT TEST switch to OFF; then rotate the CIRCUIT TEST switch clockwise through each position listed in the chart below and note whether the CIRCUIT TEST meter indication obtained differs from that listed in the chart. If a meter indication is out of tolerance, refer to a higher category of maintenance.

CIRCUIT TEST switch position	*CIRCUIT TEST meter indication*
+ 18 V	50 ± 6
BAT VOLT	Green area (50 nominal) (after 30-minute charge)
BAT CHG	20 to 80
BAT DISCH	20 to 80
OVEN AFC	0 (operate) 20 to 100 (standby)
OVEN SYNTH	20 to 100
MON AMPL	1 to 50
MAIN RCVR LINE AMPL A2.	Green area (50 nominal)
MAIN RCVR LINE AMPL A1.	Green area (50 nominal)
MAIN RCVR LINE AMPL B1.	Green area (50 nominal)
MAIN RCVR LINE AMPL B2.	Green area (50 nominal)
DIVERSITY RCVR LINE AMPL B2.	Green area (50 nominal)
DIVERSITY RCVR LINE AMPL B1.	Green area (50 nominal)
DIVERSITY RCVR LINE AMPL A1.	Green area (50 nominal)
DIVERSITY RCVR LINE AMPL A2.	Green area (50 nominal)
CCU HOLDING	50 nominal

5-11. Battery Pack Inspection and Testing

a. Battery Pack Inspection.

WARNING

The battery electrolyte is very caustic; avoid contact with the eyes and skin. To neutralize spilled electrolyte, apply 3-percent boric acid solution and wash with water.

(1) Slide the audio monitor out of the electrical equipment cabinet until the locks are engaged.

(2) Remove the audio monitor top cover by loosening the cover fasteners.

(3) Check the level and general condition

of the electrolyte through the view ports on each side of the battery pack. If electrolyte level is low, perform the following procedures:

(*a*) Unscrew the six captive mounting screws which hold the battery in place.

WARNING

Be sure that the power distribution panel MAIN POWER ON-OFF switch is set OFF before performing any additional servicing of the battery pack.

(*b*) Lift out the battery and disconnect the battery power connector by turning it counterclockwise and pulling it straight up.

(*c*) Remove the battery pack cover by removing the six retaining screws.

(*d*) Unscrew the filling cap on the cells which display low electrolyte level.

(*e*) Fill the cells within 1/8 inch of level line with distilled water.

(*f*) Replace the battery pack in the audio monitor by performing the procedures given in (*a*) through (*d*) above in reverse.

CAUTION

Do not overtighten the filling caps.

(4) If the electrolyte is discolored or cloudy, refer to higher category of maintenance.

WARNING

The battery pack must be in an upright position while charging. Tilting may result in spillage of the electrolyte. To neutralize spilled electrolyte, apply 3-percent boric acid solution immediately; otherwise, the electrolyte may damage the audio monitor chassis.

b. Battery Pack Testing. Test the battery pack as follows:

(1) With the power distribution panel MAIN POWER ON-OFF switch set to OFF, set the audio monitor CIRCUIT TEST switch to BAT DISCH.

(2) Observe the audio monitor CIRCUIT TEST meter; it should indicate between 20 to 80. If the reading is out of tolerance, refer to a higher category of maintenance repair.

(3) Set the power distribution panel MAIN POWER ON-OFF switch to ON.

(4) Set the audio monitor CIRCUIT TEST switch to BAT CHARGE.

(5) Observe audio monitor CIRCUIT TEST meter; it should indicate approximately 20 to 100. If the reading is out of tolerance, perform the procedures given below.

(*a*) Set the audio monitor CIRCUIT TEST switch to BAT VOLT.

(*b*) The audio monitor CIRCUIT TEST meter should indicate 50 ±10; if it does not, refer to a higher category of maintenance repair.

Section II. ORGANIZATIONAL TROUBLESHOOTING

5–12. General

Organizational troubleshooting of the receiving set is based on the operational checks specified in the quarterly preventive maintenance checks and services chart. To troubleshoot the equipment, perform the functions, starting with sequence number 10, in the quarterly preventive maintenance checks and services chart (para 5–6) and proceed until an abnormal condition or result is obtained. When an abnormal condition or result is obtained, refer to the troubleshooting charts (para 4–10 and 5–14).

5–13. Sectionalizing Fault to Major Component

The receiving set uses a fault interlock circuit which alerts the local and remote operators to specific equipment malfunctions. The FAULT portion of the NON-NORM/FAULT indicator on the main and diversity receivers, and the FAULT indicators on the synthesizer, automatic frequency control, and audio monitor light when a specific type of failure is present in the associated component. In standby, the audio monitor FAULT indicator will light only during a standby power failure. When the receiving set is placed in the operate condition, the fault alarm interlock circuit will respond to a fault, and the FAULT indicator on the defective major component will light. A fault indication results when the power supply outputs of individual major components drop below a usable level, or when any of the following occurs:

a. Loss of primary power.

b. Loss of synthesizer outputs (fixed LO or variable local oscillation injection).

c. Band selection failure.

d. Overload (evidenced by a tripped circuit breaker). A fault indication requires that cor-

rective action be initiated. During local and remote operation, the trouble can be isolated to a main component by noting which FAULT indicator has lighted.

e. Failure to tune 20 seconds.

5–14. Organizational Troubleshooting Chart

Item No.	*Trouble symptom*	*Probable trouble*	*Checks and corrective measures*
1	RECEIVER GROUP MAIN POWER indicator does not light when MAIN POWER ON-OFF switch is set to ON.	Defective lamp DS1, blown fuse F1 or F2 (accompanied by lighted fuse-indicator) in power distribution panel, failure in prime power.	Replace lamp DS1, or fuse F1 or F2. If power lamp remains off, refer to higher category maintenance.
2	Starting procedure cannot be performed successfully.	Defective component or circuit indicated by component FAULT indicator.	Refer to higher category maintenance.

CHAPTER 6

SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

6–1. Disassembly of Equipment

Disassembly and repackaging of the equipment for shipment or limited storage is normally performed by organizational personnel. The following procedure is recommended.

Warning: **Serious injury or DEATH may result from contact with ac line voltage. Be sure that the main ac circuit breakers are open.**

a. Removing Station Power Distribution Panel Circuit Breaker Connections. Disconnect and tag station power distribution panel circuit breakers used for 115- or 230-volt ac prime power source.

b. Prime Power Disconnect. Remove and tag the three station prime power connection wires from TB1 in the power distribution panel (fig. 2–7).

c. Main and Diversity Antenna Cables Disconnect. Remove the two antenna cables from the data distribution panel at the rear of the electrical equipment cabinet (fig. 2–19).

d. 1 MHz Frequency Standard Disconnect. Remove the 1 MHz frequency standard coaxial plug from jack J1 on RF distribution panel.

e. Full Duplex Control Data Lines Disconnect. Remove both pairs of control data lines from the data distribution panel by disconnecting the wires from terminals 9 through 13 of terminal board TB1 (fig. 2–19).

f. Audio Lines Disconnect. Remove the eight audio lines from the data distribution panel by disconnecting the lines from terminals 1 through 12 of terminal boards TB2 and TB3 (fig. 2–19).

g. Removal of Battery Pack. Remove the battery pack from the audio monitor as follows:

(1) Loosen the four captive screws from the front panel of the audio monitor and slide the audio monitor forward.

(2) Remove the audio monitor top cover by removing its securing screws.

(3) Loosen the four captive screws which hold the battery pack in place and lift the battery from the chassis.

(4) Disconnect the battery pack cable from jack J3.

(5) Replace the audio monitor top cover and secure the mounting screws.

(6) Slide the audio monitor back into the electrical equipment cabinet assembly and tighten the four front panel captive screws.

h. Removal of Electrical Equipment Cabinet From Site. Perform the following procedure to remove the Electrical equipment cabinet assembly from the site (fig. 2–5 and 2–6):

(1) Use the information contained in paragraph 2–6 to remove the synthesizer (1A2), main receiver (1A3), diversity receiver (1A4), automatic frequency control (1A5), audio monitor (1A6), and control converter (1A7, from the cabinet assembly (1A1).

(2) Release electrical equipment cabinet from its mounting by removing the four anchoring bolts and washers.

(3) Lift and remove cabinet using hoist or forklift of 2000 pounds minimum capacity.

i. Removal of Remote Control Unit Prime Power and Control Data Connections.

Warning: **Disconnect and tag station power distribution panel circuit breaker used for 115/230 vac prime power source. Serious injury or death may result from contact with ac line voltage.**

(1) Remove 115/230 vac power plug from

jack FL1J1 on the remote control unit (fig. 2–17).

(2) Disconnect the two control data line pairs by removing plug from jack TTY J2.

j. Removal of Remote Control Unit From Site. Loosen the four captive screws at the remote control unit front panel and remove remote control unit from equipment rack or console.

6–2. Repackaging for Shipment and Limited Storage

a. Equipment that is to be removed from service for periods exceeding approximately 2 weeks, or equipment that is to be shipped for use by other personnel or activities, is normally repacked by organizational personnel. Use the materials listed in *c* below and pack the equipment in accordance with the information referenced in *d* below.

b. If the AN/FRR–79 is to be transported over short distances under control of the using unit for immediate reuse:

(1) Disconnect the receiving group and the remote control (para 6–1) 115/230 vac power, and data connections.

(2) Use a hoist or forklift with a minimum capacity of 2,000 pounds to set the equipment cabinet into a wooden box 89 inches high, 35 inches deep, and 29 inches wide.

(3) Use rags or crumpled paper for padding to protect all front panel controls and indicators against damage during transit.

(4) Protect the remote control unit during transit (2) above.

(5) Place the remote control into a wooden box 22 inches deep, 22 inches wide, and 8 inches high.

Caution: **Use extreme care in lifting and transporting the receiving set.**

c. The following materials are required for packing Receiving Set, Radio AN/FRR–79. Consult SB 38–100 for stock numbers of materials. Figures 2–3 and 2–4 show the materials required for packing the AN/FRR–79.

Material	*Quantity*
Metal strapping	200 feet
Wooden packing boxes and covers.	9 boxes and covers
Cardboard boxes	19 boxes
Bonded fiber top cushion	9 cushions
Moisture-waterproof barrier	200 square feet
Corrugated filler	100 square feet
Dessicant	10 cloth containers
Nails	3 pounds
Skid	1 (for cabinet assembly)
Bolts	4 (for skid)

d. Packing Instructions.

(1) Reverse the procedures given in chapter 2 when repackaging Control, Receiver C–7667/FRR–79.

(2) Reverse the procedures given in chapter 2 when repackaging the Receiver Group OR–31/FRR–79.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

6–3. Authority of Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedures given in paragraph 6–5 will be used to prevent further use of the equipment.

6–4. Priorities for Destruction

When lack of time prevents complete destruction of the AN/FRR–79, destroy its essential components. The priority number in the following chart shall be used to determine the priority of destruction of essential components.

Priority number	*Major component*
1	Synthesizer
2	Receivers
3	Automatic frequency control
4	Audio monitor
5	Control converter
6	Remote control unit
7	Equipment cabinet assembly

6–5. Methods of Destruction

Use any of the methods given below to destroy the equipment. The time available will be the major factor for the method used. The tactical

situation will also determine in what way the destruction order will be carried out.

a. Smash. Smash the tuning indicators, the dials, the meter, the modules, the printed circuit cards, the coils, the transformers, and the spare parts; use sledges, axes, hammers, crowbars, or any other heavy tools available to smash the interior of the equipment.

b. Cut. Cut all the cords and cables in a number of places; slash the interior wiring and cabling. Use axes, machetes, and similar tools to cut the cabling, the cording, and the wiring.

Warning: **Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.**

c. Burn. Burn as much of the equipment as is flammable; use gasoline, oil, or flamethrowers. Burn the technical manuals first. Pour gasoline on the cut cables and on the internal wiring and ignite it.

d. Explode. If explosives are necessary, use firearms, grenades, or TNT.

e. Dispose. Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

Figure 6-1. Receiver group cording diagram.
(Located in back of manual)

APPENDIX A

REFERENCES

Following is a list of publications available to the operator and organizational maintenance personnel of Receiving Set, Radio AN/FRR-79.

AN/FRR-79.	Index of Technical Manuals, Technical Bulletins, Supply Manuals, (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-4	
DA Pam 310-7	U.S. Army Equipment Index of Current Modification Work Orders.
TB SIG 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 9-213	Painting Instructions for Field Use.
TM 11-6140-203-12	Operator and Organizational Maintenance Manual: Nickel-Cadmium Storage Batteries.
TM 38-750	Army Equipment Record Procedures.

APPENDIX B
BASIC ISSUE ITEMS

Section I. INTRODUCTION

B–1. Scope

This appendix lists items comprising an operable equipment and those required for installation, operation, or operator's maintenance for Receiving Set, Radio AN/FRR–79.

B–2. Explanation of Columns

The following is a list of explanations of columns in section II.

a. Source, Maintenance, and Recoverability Codes (SMR) Column.

(1) *Source code (S).* The selection status and source for the listed item is the first code indicated in this column. The source codes used and their explanations are—

Code	*Explanation*
P	Applies to repair parts that are stocked in or supplied from GSA/DSA, or Army supply system, and authorized for use at indicated maintenance categories.
G	Applies to major assemblies that are procured with PEMA funds for initial issue only to be used as exchange assemblies at DSU and GSU category. These assemblies will not be stocked above DSU and GSU category or returned to depot supply category.

(2) *Maintenance code (M).* The lowest category of maintenance authorized to install the item is indicated by the second code in the column. The maintenance category code and its explanation is—

Code	*Explanation*
O	Organizational Maintenance

(3) *Recoverability code (R).* The recoverability code is the third code in the column. It indicates whether unserviceable items should be returned for recovery or salvage. Recoverability code and its explanation is as follows:

Note. When no code is indicated in the recoverability column, the part will be considered expendable.

Code	*Explanation*
R	Applies to repair parts and assemblies that are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.

b. Federal Stock Number Column. This column indicates the Federal stock number for the item.

c. Description Column. This column includes the Federal item name and any additional description of the item which may be required. A part number or other reference number is followed by the applicable five-digit Federal Supply Code for Manufacturers. Usable on code column is not used.

d. Unit of Measure Column. The unit used as a basis of measure (e.g., ea, pr, ft, yd, etc.) is given in this column.

e. Quantity Incorporated in Unit Column. The total quantity of the item used in the equipment is given in this column.

f. Quantity Furnished With Equipment Column. This column lists the quantity of the item supplied for initial operation of the equipment and/or the quantities authorized to be kept on hand by the operator for maintenance of the equipment.

g. Illustrations Column.

(1) *Figure number (a).* The number of the illustration on which the item is shown is indicated in this column.

(2) *Item No. or reference designation (b).* The reference designation and/or item number callout used to reference the item on the illustration appears in this column.

SECTION II. BASIC ISSUE ITEMS

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION Reference Number & Mfr Code USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) QTY FURN WITH EQUIP	(7) ILLUSTRATIONS (a) FIG. NO.	(7) ILLUSTRATIONS (b) ITEM NO. OR REFERENCE DESIGNATION
G-O-R	5820-937-2887	RECEIVING SET, RADIO AN/FRR-79: p/n 20006-700A1-1; 97983 (This item is nonexpendable)					
		TECHNICAL MANUAL TM 11-5820-601-12	ea	1	1		
		For technical manuals the quantity indicates the maximum number of copies authorized for packing or issue with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to the minumum actual requirements as determined by the commanding officer of the unit.					
G-O-R	5820-998-6088	CABINET, ELECTRICAL EQUIPMENT CY 6450/GRR-79: p/n 20006 510A3-1; 97983 (This item is nonexpendable)	ea	1	1	1-1	A1
G-O-R	5820-998-6090	CONTROL CONVERTER C 7666/FRR-79: p/n 20006-200A1-1 (This item is nonexpendable)	ea	1	1	1-1	A7
G-O-R	5820-998-6094	CONTROL, ELECTRICAL FREQUENCY C-7665/FRR-79:p/n 20006-100A4-1; 97983 (This item is nonexpendable)	ea	1	1	1-1	A5
G-O-R	5820-998-6092	CONTROL, RECEIVER C-7667/FRR-79: p/n 20006-200A4-1 (This item is nonexpendable)	ea	1	1	1-1	2
P-O	5920-284-9220	FUSE, CARTRIDGE: p/n F02B250V1A; 81349	ea	10	10	1-9	1A7F1 thru 1A7F6, 2F1, 2F2, 2F3, 2F4
P-O	5920-296-1517	FUSE, CARTRIDGE: p/n F03A250V3A; 81349	ea	12	15	1-9	A1F3 through A1F14
P-O	5920-280-5002	FUSE, CARTRIDGE: p/n F03A250V10A; 8.349	ea	2	5	1-9	A1F1, A1F2
P-O	6240-682-3411	LAMP, GLOW: 105-125 vac; 1/7 w; NE51 H; 08806	ea	1	1	1-9	DSC-1
P-O		LAMP, GLOW: p/n 80EC4; 96182	ea	4	1	1-9	2
P-O		LAMP, INCANDESCENT: p/n 2311; 92966	ea	58	9	1-9	
P-O	6240-940-7070	LAMP, INCANDESCENT: p/n 370; 08806	ea	52	7	1-9	A3a, A4a, A5a, A6a
P-O	6240-155-7836	LAMP, INCANDESCENT: p/n MS25237-327; 96906	ea	40	5	1-9	
P-O	6240-155-7857	LAMP, INCANDESCENT: p/n MS25237-328; 96906	ea	1	1	1-9	
G-O-R	5820-886-1668	MONITOR, AUDIO FREQUENCY ID-1562/FRR-79; p/n 20006-100A3-1; 97983 (This item is nonexpendable)	ea	1	1	1-1	A6
G-O-R	5820-998-6095	RECEIVER GROUP OR-31/FRR-79; p/n 20006-700A2; 97983 (This item is nonexpendable)	ea	1	1	1-1	1
G-O-R	5820-998-6097	RECEIVER, RADIO R-1543/FRR-79: p/n 20006-100A1-1 (This item is nonexpendable)	ea	2	2	1-1	A3, A4
G-O-R	5820-883-8319	SYNTHESIZER, ELECTRONIC FREQUENCY O-1488/FR; p/n 20006-900A1-1; 97983 (This item is nonexpendable)	ea	1	1	1-1	A2
		NO ACCESSORIES, TOOLS, OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT					
		NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THE EQUIPMENT					

APPENDIX C
ORGANIZATIONAL REPAIR PARTS

Section I. INTRODUCTION

C-1. Scope

This appendix contains a list of repair parts required for the performance of organizational maintenance for Receiving Set, Radio AN/FRR-79.

Note. No special tools, test and support equipment are required.

C-2. General

The repair parts list is divided into the following sections.

a. Prescribed Load Allowance (PLA), Section II. The PLA is a consolidated listing of repair parts allocated for initial stockage at the organizational maintenance category. This is a mandatory minimum stockage allowance.

b. Repair Parts for Organizational Maintenance, Section III. Repair parts authorized for organizational maintenance are included in this section.

Note. All indexes noted below are cross-referenced to index numbers. The index numbers appear in ascending sequence in column 1 of the repair parts list (para C-3*a*). The index number for the particular item will be the same for the item in all sections of this appendix.

c. Federal Stock Number Cross-Reference to Index Number, Section IV. This is a cross-reference index of Federal stock numbers to index numbers.

d. Figure and Item Number Cross-Reference to Index Number, Section V. This is a cross-reference index of figure number and item number (or reference designation) to index number. The figure numbers are listed in numerical sequence; item numbers and/or reference designations are listed for each figure.

e. Reference Designation Cross-Reference to Index Number, Section VI. This is a cross-reference index of reference and/or item numbers to index numbers.

C-3. Explanation of Columns

An explanation of the columns is given below.

a. Source, Maintenance, and Recoverability Codes (SMR) and Index Numbers Column. The first line in this column lists the applicable SMR codes for the part. Listed in ascending order directly below the SMR codes is the index number assigned to the repair part.

(1) *Source code (S).* The selection status and source for the listed item is noted here. Source codes and their explanations are as follows:

Code	*Explanation*
P	Applies to repair parts that are stocked in or supplied from the GSA/DSA, or Army supply system, and authorized for use at indicated maintenance categories.
G	Applies to major assemblies that are procured with PEMA funds for initial issue only to be used as exchange assemblies at DSU and GSU category. These assemblies will not be stocked above DSU and GSU category or returned to depot supply category.

(2) *Maintenance code (M).* The lowest category of maintenance authorized to install the listed item is noted here.

Code	*Explanation*
O	Organizational maintenance

(3) *Recoverability code (R).* The information in this column indicates whether unserviceable items should be returned for recovery or salvage. Recoverability code and its explanation is as follows:

Note. When no code is indicated in the recoverability column, the part will be considered expendable.

Code	*Explanation*
R	Applies to repair parts and assemblies which are economically repairable at DSU and GSU activities and normally are furnished by supply on an exchange basis.

b. Federal Stock Number Column. The Federal stock number for the item is listed in this column.

c. Description Column. This column includes the Federal item name and any additional description of the item required, the manufacturer's part number (reference number), and the applicable five-digit Federal Supply Code for Manufacturer's (para C–5). Usable on code column is not used. For subsequent appearances of the same item, the manufacturer's code and part number (reference number) are omitted. The words "same as" followed by the index number assigned to the item when it first appeared in the list will follow the item name; e.g., "RESISTOR, FIXED, COMPOSITION: SAME AS A298."

d. Unit of Measure Column. The unit used as a basis of measure (e.g., ea, pr, ft, yd, etc.) is indicated in this column.

e. Quantity Incorporated in Unit Column. The quantity of repair parts in an assembly is given in this column.

f. Maintenance Allowances Column.

(1) The maintenance allowance columns are divided into subcolumns. Indicated in each subcolumn opposite the first appearance of the item is the total quantity of items authorized for the number of equipments supported. Subsequent appearances of the same item will have no entry in the allowance columns, but will have a reference in the description column to the first appearance of the item. Items authorized for use as requied, but not for initial stockage, are identified with an asterisk (*) in the allowance column.

(2) The quantitative allowances for organizational category of maintenance represents one initial prescribed load for a 15-day period for the number of equipments supported. Units and organizations authorized additional prescribed loads will multiply the number of prescribed loads authorized by the quantity of repair parts reflected in the appropriate density column to obtain the total quantity of repair parts authorized.

(3) Subsequent changes to organizational allowances will be limited as follows: No change in the range of items is authorized. If additional items are considered necessary, recommendations should be forwarded to Commanding General U.S. Army Electronics Command, ATTN: AMSEL–ME–NMP–CT, Fort Monmouth, N.J. 07703, for exception or revision to the allowance list. Revisions to the range of items authorized will be made by the USA ECOM National Maintenance Point based upon engineering experience, demand data, or TAERS information.

g. Illustrations Column.

(1) *Figure number* (*a*). The number of the illustration in which the item is shown is indicated in this column.

(2) *Item No. or reference designation* (*b*). The callout number or reference designation used to reference the item in the illustration appears in this column.

C–4. Location of Repair Parts

a. This appendix contains three cross-reference indexes (sec. IV, V, and VI), to be used to locate a repair part when either the Federal stock number, reference number (manufacturer's part number), figure number, or reference designation is known. The first column in each cross-reference index is prepared, as applicable, in numerical or alphanumerical sequence. The last column of each cross-reference index lists the index number assigned to the part.

b. Refer to the appropriate cross-reference index (para C–2*c, d, e*), and note the index number in the last column; then refer to the repair parts list to locate the index number

which is listed in ascending order in column 1 of the repair parts list.

C–5. Federal Supply Codes

This paragraph lists the Federal supply code and the associated manufacturer's name.

Code	*Manufacturer*
08806	General Electric Co., Miniature Lamp Dept
81349	Military Specifications
92966	Hudson Lamp Co.
96182	Master Specialties Co.
96906	Military Standards
97983	Litton Systems Inc. Litcom Div.

SECTION II. PRESCRIBED LOAD ALLOWANCE

(1) FEDERAL STOCK NUMBER	(2) DESCRIPTION / USABLE ON CODE	(3) 15-DAY ORG. MAINT. ALLOWANCE (a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100
	GROUP 1 CABINET, ELECTRICAL EQUIPMENT CY-6450/FRR-79 (REF A1)				
5920-280-5002	FUSE, CARTRIDGE: F03A250V10A; 81349	2	3	8	13
5920-296-1517	FUSE, CARTRIDGE: p/n F03A250V3A	3	10	25	47
6240-682-3411	LAMP, GLOW: p/n NE51H; 08806	*	*	2	2
	GROUP 2 RECEIVER, RADIO R-1543/FRR-79 (REF A3, A4)				
5355-556-0145	KNOB: p/n MS 91528-1K2B; 96906	*	*	2	2
6240-940-7070	LAMP, INCANDESCENT: p/n 370; 08806	4	13	30	57
	GROUP 4 MONITOR AUDIO FREQUENCY ID-1562/FRR-79 (REF A6)				
5355-994-3435	KNOB: MS 91528-1E2B; 96906	*	*	*	2
	GROUP 5 CONTROL, CONVERTER C-7666/FRR-79 (REF 1A7)				
6240-155-7836	LAMP, INCANDESCENT: p/n MS 25237-327; 96906	6	21	47	91
6240-155-7857	LAMP, INCANDESCENT: MS 25237-328; 96906	*	*	2	2
5920-284-9220	FUSE, CARTRIDGE: p/n F02B250V1a; 81349	3	10	25	47
	LAMP, GLOW: p/n 80EC4; 96182	*	2	2	3
	GROUP 7 CONTROL, RECEIVER C-7667/FRR (2)				
5355-959-3161	KNOB: p/n MS 9152B-0K1B; 96906	*	*	2	2
	LAMP, INCANDESCENT: p/n 2311; 92966	3	10	25	47

SECTION III. REPAIR PARTS FOR ORGANIZATIONAL MAINTENANCE

(1) SMR CODE / INDEX NO.	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION Reference Number & Mfr Code / USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) 15-DAY ORGANIZATIONAL MAINTENANCE ALW (a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100	(7) ILLUSTRATIONS (a) FIG NO.	(b) ITEM NO. OR REFERENCE DESIGNATION
G-O-R A001	5820-937-2887	RECEIVING SET, RADIO AN/FRR-79: p/n 20006-700A1-1; 97983								
		GROUP I CABINET, ELECTRICAL EQUIPMENT CY-6450/FRR-79 (REF A1)								
P-O A002	5920-280-5002	FUSE, CARTRIDGE: F03A250V10A; 81349	ea	4	2	3	8	13	1-9	A1F1, A1F2, A1F1A, A1F2A
P-O A003	5920-296-1517	FUSE, CARTRIDGE: p/n F03A250V3A; 81349	ea	12	3	10	25	47	1-9	A1F3 thru A1F14
P-O A004	6240-682-3411	LAMP, GLOW: p/n NE51H; 08806	ea	1	*	*	2	2	1-9	DS1
		GROUP II RECEIVER, RADIO R-1543/FRR-79 (REF A3, A4)								
P-O A005	5355-556-0145	KNOB: p/n MS 91528-1K2B; 96906	ea	12	*	*	2	2	3-2	
P-O A006	6240-940-7070	LAMP, INCANDESCENT: p/n 370; 08806	ea	2	4	13	30	57	1-9	
		GROUP III CONTROL ELECTRONIC FREQUENCY C-7665/FRR-79 (REF A5)								
P-O A007	5355-556-0145	KNOB: (Same as A005)	ea	2					3-3	
P-O A008	6240-940-7070	LAMP, INCANDESCENT: (Same as A006)	ea	2					1-9	
		GROUP IV MONITOR AUDIO FREQUENCY ID-1562/FRR-79 (REF A6)								
P-O A009	5355-994-3435	KNOB: MS91528-1E2B; 96906	ea	1	*	*	*	2	3-4	
P-O A010	5355-556-0145	KNOB: (Same as A005)	ea	3					3-4	
P-O A011	6240-940-7070	LAMP, INCANDESCENT: (Same as A006)	ea	2					1-9	
		GROUP V CONTROL, CONVERTER C-7666/FRR-79 (REF 1A7)								
P-O A012	5920-284-9220	FUSE, CARTRIDGE: p/n F02B250V1a; 81349	ea	6	3	10	25	47	1-9	1A7F1 thru 1A7F6
P-O A013		LAMP, GLOW: p/n 80EC4; 96182	ea	2	*	2	2	3	1-9	
P-O A014	6240-155-7836	LAMP, INCANDESCENT: p/n MS 25237-327; 96906	ea	2	6	21	48	91	1-9	
P-O A015	6240-155-7857	LAMP, INCANDESCENT: p/n MS 25237-328; 96906	ea	1	*	*	2	2	1-9	
		GROUP VI SYNTHESIZER ELECTRONIC EQUIPMENT O-1488/FR (REF A2)								
P-O A016	5355-556-0145	KNOB: (Same as A005)	ea	7					3-1	
		GROUP VII CONTROL, RECEIVER C-7667/FRR (2)								
P-O A017	5920-284-9220	FUSE, CARTRIDGE: (Same as A012)	ea	4					1-9	2F1, 2F2, 2F3, 2F4
P-O A018	5355-959-3161	KNOB: p/n MS9152B-0K1B; 96906	ea	6	*	*	2	2	1-1	
P-O A019	6240-155-7836	LAMP, INCANDESCENT: (Same as 014)	ea	37					1-9	2DS1, 2DS2A, thru 2DS2D, 2DS3A thru 2DS3O, 2DS4D, 2DS5A thru 2DS5D, 2DS6A thru 2DS6D, 2DS7D, 2DS8D, 2DS9A thru 2DS9D, 2DS10A thru 2DS10D

SECTION III. REPAIR PARTS FOR ORGANIZATIONAL MAINTENANCE (CONTINUED)

(1) SMR CODE / INDEX NO.	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION / Reference Number & Mfr Code / USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) 15-DAY ORGANIZATIONAL MAINTENANCE ALW (a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100	(7) ILLUSTRATIONS (a) FIG NO.	(b) ITEM NO. OR REFERENCE DESIGNATION
P-O A020		LAMP, INCANDESCENT: p/n 2311; 92966	ea	11	3	10	25	47	1-9	
P-O A022	6240-940-7070	LAMP, INCANDESCENT: (Same as A006)	ea	2					1-9	

SECTION IV. INDEX-FEDERAL STOCK NUMBER CROSS REFERENCE TO INDEX NUMBER

FEDERAL STOCK NUMBER	INDEX NO.	FEDERAL STOCK NUMBER	INDEX NO.	FEDERAL STOCK NUMBER	INDEX NO.
5355-556-0145	A005				
5355-959-3161	A018				
5355-994-3435	A009				
5820-937-2887	A001				
5920-280-5002	A002				
5920-284-9220	A012				
5920-296-1517	A003				
6240-155-7836	A014				
6240-155-7857	A015				
6240-682-3411	A004				
6240-940-7070	A006				

REF NUMBER	INDEX NUMBER
2311	A020
80EC4	A013

SECTION V. INDEX-FIGURE AND ITEM NUMBER CROSS REFERENCE TO INDEX NUMBER

FIG. NO.	ITEM NO. OR REFERENCE DESIGNATION	INDEX NO.
1-9	A1F1, A1F2	A002
	A1F1A, A1F2A	A002
	A1F3 thru A1F14	A003
	DS1	A004
	1A7F1 thru 1A7F6	A012
	2DS1	A019
	2DS2A thru 2DS2D	A019
	2DS3A thru 2DS3D	A019
	2DS4D	A019
	2DS5A thru 2DS5D	A019
	2DS6A thru 2DS6D	A019
	2DS7D	A019
	2DS8D	A019
	2DS9A thru 2DS9D	A019
	2DS10A thru 2DS10D	A019
	2F1, 2F2, 2F3, 2F4	A017

FIG. NO.	ITEM NO. OR REFERENCE DESIGNATION	INDEX NO.

SECTION VI. INDEX-REFERENCE DESIGNATION CROSS REFERENCE TO INDEX NUMBER

REFERENCE DESIGNATION	INDEX NO.	REFERENCE DESIGNATION	INDEX NO.	REFERENCE DESIGNATION	INDEX NO.
A1F1, A1F2	A002				
A1F1A, A1F2A	A002				
A1F3 thru A1F14	A003				
DS1	A004				
1A7F1 thru 1A7F6	A012				
2DS1	A019				
2DS2A thru 2DS2D	A019				
2DS3A thru 2DS3D	A019				
2DS4D	A019				
2DS5A thru 2DS5D	A019				
2DS6A thru 2DS6D	A019				
2DS7D	A019				
2DS8D	A019				
2DS9A thru 2DS9D	A019				
2DS10A thru 2DS10D	A019				
2F1, 2F2, 2F3, 2F4	A017				

APPENDIX D

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

D–1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

D–2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

b. Test. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc. This is accomplished with external test equipment and does not include operation of the equipment and operator type tests using internal meters or indicating devices.

c. Service. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

d. Adjust. To rectify to the extent necessary to bring into proper operating range.

e. Align. To adjust two or more components or assemblies of an electrical or mechanical system so that their functions are properly synchronized. This does not include setting the frequency control knob of radio receivers or transmitters to the desired frequency.

f. Calibrate. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

g. Install. To set up for use in an operational environment such as an encampment, site, or vehicle.

h. Replace. To replace unserviceable items with serviceable like items.

i. Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes, but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. Overhaul. Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

k. Rebuild. The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

l. Symbols. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

D–3. Explanation of Format

a. Column 1, Group Number. Column 1 lists

group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, Functional Group. Column 2 lists the noun names of components, assemblies, subassemblies and modules on which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

Code	*Maintenance category*
C	Operator/crew
O	Organizational maintenance
F	Direct support maintenance
H	General support maintenance
D	Depot maintenance
*OS	Off-site maintenance

*NOTE

Organizational maintenance category through general support maintenance category will be on site.

d. Column 4, Tools and Test Equipment. Column 4 specifies, by code, those tools and test equipment required to perform the designated function. The numbers appearing in this column refer to specific tools and test equipment which are identified in table I.

e. Column, Remarks. Self-explanatory.

D–4. Explanation of Format of Table I, Tool and Test Equipment Requirements

The columns in Table I, Tool and Test Equipment Requirements are as follows:

a. Tools and Equipment. The numbers in this column coincide with the numbers used in the tools and equipment column of the Maintenance Allocation Chart. The numbers indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

d. Federal Stock Number. This column lists the Federal stock number of the specific tool or test equipment.

e. Tool Number. Not used.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
1	RECEIVER SET, RADIO AN/FRR-79, SM-D-587000 20006-700A1-1	O												Visual.
			O											BITE.
			F										1,2,3,5,6, 8,L1	Sensitivity, frequency response and stability, IM distortion.
			OS										15,18,21,22, 23,28	Spurious frequency.
				O										Clean.
					F					F				Signal adjustment.
									F				39,40	Replace defective subassemblies and assemblies.
					O									BITE.
											D			Restore to serviceable condition.
1A1	RECEIVER RADIO, SM-D-587130 20006-700A2-1 (1)	O												Visual.
			OS										1,2,3,5,6, 8,15,18,21, 22,23,L1	Sensitivity, frequency response and stability, IM distortion.
					F									Signal adjustment.
									F				39,40	Defective subassemblies.
											D			Restore to serviceable condition.
1A1A1	CABINET ELECTRONIC EQUIPMENT, SM-D-587103 20006-510A3-1 1A1	O												Visual.
			F										6	Continuity.
										F			1,6,39,40, 41	Replace defective piece parts.
1A1A1A1	DATA DISTRIBUTION PANEL 20006-504A1-1 1A1A2 ANTENNA PROTECTOR 20006-504B1 (1A1A2A1,1A1A2A2)	O												
			F										2,3,39 40,41	Insertion loss and filter characteristics.
									F				39,40	Defective module.
										F			2,3,39 40,41	Replace defective piece parts.
										D			2,3,39 40,41	Replace defective piece parts external to 1A1A2A1A2.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A1A2	PANEL, RF DISTRIBUTION, SM-D-587118 20006050 5A1-1 1A1A4	O	F										1,2,3	Gain, port isolation, frequency response.
					F								1,2,3	Voltage.
									F	F			1,2,3,39,40, 41	Defective piece parts.
1A1A1A2A1	NETWORK, HYBRID CIRCUIT, SM-C-587119 20006-505B1-1 1A1A4A1,1A1A4A2	O	F										2,3	RF output voltage.
					F								2,3	Voltage.
									F				39,40	Defective subassembly.
1A1A1A2A2	NETWORK, HYBRID 20006-505B7-1 1A1A4A3	O	F										2,3	
									F				39,40	
1A1A1A2A3	AMPLIFIER, HYBRID, SM-D-587120 1A1A4A4 20006-505B3-2	F	F										1,2,7,16,34, 32	Gain, port isolation, frequency response, output level, and VSWR.
					D								1,2,7,16,32, 34	Voltage and frequency.
									F				39,40	Defective subassembly.
										D			1,2,7,16,32, 34,39,40,41	Defective piece parts.
1A1A1A2A4	AMPLIFIER, HYBRID, SM-C-587121 20006-505B3-1 1A1A4A5	F	D										1,2,7,16,32, 34	Gain, port isolation, frequency reponse, output level, and VSWR.
					D								1,2,7,16,32, 34	Voltage and frequency.
									F				39,40	Defective subassembly.
										D			1,2,7,16,32, 34,39,40,41	Defective piece parts.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A1A3	PANEL, POWER DISTRIBUTION 20006-503A1-1 1A1A1	F												
			F										1,2,3 39,40	Voltage.
									F					
										D			1,2,3,39,40, 41	Replace defective parts.
1A1A2	RECEIVER, RADIO, SM-D-587003 20006-100A1-1 1A3,1A4	O												Visual.
			O											BITE.
			OS										1,3,8,15,26 L1,L2,L7	Sensitivity, AGC control range, IM distortion, tuning.
			F										1,2,3,4,6, 8,L1,L2, L7	
					F									AGC, frequency.
				O										Clean.
										F			39,40,41	Replace defective piece parts.
										F			39,40,41	REPLACE DEFECTIVE ASSEMBLIES.
											D			
1A1A2A2	EQUALIZER, HF, SM-C-587018 20006-102A1-1 1A3A21,1A4A21	F												Visual.
			D										2,3,4,7,8, 28,33,L12	AGC, HF response, IM distortion, VSWR.
					D								2,3,4,7,8, 28,33,L12 39,40	Voltage and frequency.
									F					
										D			2,3,4,7,8, 28,33,39,40, 41,L12	Replace defective piece parts.
1A1A2A3	MIXER STAGE FREQUENCY, SM-D-587019 20006-103A1-1 1A3A20,1A4A20	F												Visual.
			D										1,3,7,15, 16,20,26, 32,33,37	Gain, sensitivity, IM distortion, monitor output.
					D								1,3,7,15, 16,20,26, 32,33,37 39	Voltage and frequency.
									F					

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A2A3 (cont)										D			1,3,7,15, 20,26,32,33, 37,39,40,41	Replace defective piece parts.
1A1A2A4	MIXER STAGE FREQUENCY, SM-D-587020 20006-104A1-1 1A3A16,1A4A16	F												Visual.
			D										2,3,6,7,8, 16,18,28,32, 33	Gain, sensitivity, IM distortion, L.O. monitor output.
					D								2,3,6,7,8,16, 18,28,32,33 39	Voltage and frequency.
									F					
										D			2,3,6,7,8,16, 18,28,32,33, 37,39,40,41	Replace defective piece parts.
1A1A2A5	AMPLIFIER IF, SM-D-587022 20006-108A1-1 1A3A9 thru 1A3A12 1A4A9 thru 1A4A12	F												Visual.
			D										1,2,3,4,5,7, 8,10,15,18,36 36,L12	If tuning, input impedance, sensitivity, AGC range, AF response, IM distortion, AGC constants.
					D								1,2,3,4,5,7, 8,10,15,18, 36,L12 39	Voltage and frequency.
									F					
										D			1,2,3,4,5,7, 8,10,15,18, 36,39,40,41, L12	Replace defective piece parts.
1A1A2A6	NET HYBRID CIRCUIT, SM-S-587021 20006-107A1-1 1A3A3,1A4A3	F												Visual.
			D										1,2,3,5,8,25, 31,L12	Gain, port impedance, port isolation, IM distortion.
					D								2,3,L12 39	Voltage and frequency.
									F					

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A2A6 (cont)										D			1,2,3,5,8,25, 31,39,40,41, L12	Replace defective piece parts.
1A1A2A7	FILTER ASSEMBLY ELEC, SM-D-587061 20006-816A1-1 1A3A25,1A4A25	F												Visual.
			D										1,3,8,10,16, 28,L12	Frequency response, insertion loss, DC switching, crosstalk, contact resistance, VSWR.
						D							1,3,8,10,16, 28,L12	Frequency levels.
									F				39	
										D			1,3,8,10,16, 28,39,40,41, L12	Replace defective piece parts.
1A1A2A7A1	FILTER BANDPASS 20006-816B2-1 (1A3FL18A4) 20006-816B1-1 (1A3FL18A3) 20006-816B1-2 (1A3FL18A2)	D												Visual.
			D										1,2,3,10	Frequency rejection, insertion loss, VSWR, bandwidth.
						D							1,2,3,10	Frequency.
									D				39	
										D				Determine disposition.
1A1A2A7A2	RELAY ASSEMBLY (148-141-1) (1A3FL18A5K1A,K1B) (148-141-2) (1A3FL18A5K2B,K2B)													
1A1A2A8	PRESELECTOR RF, SM-D-587126 20006-130A1-1 1A3A37,1A4A37	F												Visual.
			D										2,3,8,32,33	Tracking.
						D							2,3,8,32,33	Bandpass alignment.
									F				39	
										D				Determine disposition.
1A1A2A9	POWER SUPPLY, SM-D-587046 20006-127A1-1 1A3A15,1A4A15	O												Visual.
			F										4,6,L2	Line and load regulation, ripple, current limiting.
					F								4,6,L2	Voltage.
										F			4,6,39,40, 41,L2	Replace defective piece parts.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A2A9A1	CIRCUIT CARD ASSEMBLY 20006-924B2-1 1A3A15A1,1A4A15A1 20006-924B2-2 1A3A15A2,1A4A15A2	F	D										4,6,7,14,L2	Line and load regulation, ripple and current limiting.
					D								4,6,7,14,L2	Voltage.
									F				39	
										D			4,6,7,14,39, 40,41,L2	Replace defective piece parts.
1A1A2A10	ALARM MONITOR 20006-117A1-1 1A4A29	F	D										6	Functional operation.
									F				39	
										D			6,39,40,41	
1A1A2A11	SELECTOR, AGC, SM-D-587045 20006-126A1-1 1A4A8,1A3A8	F	D										6	Relay and circuit operation.
									F				39	
										D			6,39,40,41	Replace defective piece parts.
1A1A2A12	FILTER, LOW PASS 20006-136A1-1 1A3A38,1A4A38	F	D										2,3,8,16	
									F				39	
										D				Determine disposition.
1A1A2A13	HYBRID NETWORK, 1.75 MHz 20006-113A1 1A3A26,1A4A26	F	D										2,3	
									F				39	
										D			2,3,39,40,41	Determine disposition.
1A1A3	CONTROL, ELECTRICAL 20006-100A4-1 1A5	O	O F										1,L1	Built in test equipment (BITE).
				O										Clean.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A3 (cont)										F			1,39,40,41,L1	Replace defective piece parts.
									F		D		39,40	Defective assemblies. Return to serviceable condition.
1A1A3A1	CALIBRATION FREQUENCY, SM-C-587117 20006-131A1-1 1A5A2	F												Visual.
			D										1,7,L1	Alignment, phase detector response.
						D							1,7,L1	Frequency and voltage.
									F				39	
										D			1,7,39,40, 41,L1	Replace defective piece parts.
1A1A3A2	DETECTOR RF, SM-C-587131 20006-135A1-1 1A5A39	F												Visual.
			D										1,7,10,L1	Frequency discriminator alignment phase detector alignment, phase lock.
						D							1,7,10,L1	Phase detector.
									F				39	
										D			1,7,10,39, 40,41,L1	Replace defective piece parts.
1A1A3A3	CONTROL ELECTRONIC FREQUENCY, SM-C-587124 20006-132A1-1 1A5A5	F												Visual.
			D										L1	Timer, continuity, relay drivers.
					D								L1	Voltage.
									F				39	
										D			39,40,41,L1	Replace defective piece parts.
1A1A3A4	AMPLIFIER IF, SM-C-587023 20006-109A1-1 1A5A13	F												Visual.
			D										1,2,3,7,32, 33,L1,38	Amplitude response, bandwidth, gain, IF tuning.
					D								1,2,3,7,32, 33,L1,38	IF tuning and bandwidth.
									F				39	

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A3A4 (cont)										D			1,2,3,7,32, 39,40,41,L1	Replace defective piece parts.
1A1A3A5	OSCILLATOR RF, SM-D-587040	F												Visual.
	20006-122A1-1 1A5A31		D										1,3,24,28,L1	Voltage, harmonic rejection, 24 hour stability.
					D								1,3,24,28,L1	Voltage and frequency.
									F				39	
										D			1,3,24,28,39, 40,41,L1	Replace defective piece parts.
1A1A3A6	MONITOR RF, SM-C-587125	F												Visual.
	20006-133A1-1 1A5A4		D										10,L1	Servo sensitivity and potentiometer range, null adjustment.
					D								10,L1	Voltage.
									F				39	
										D			10,39,40,41, L1	Replace defective piece parts.
1A1A3A7	POWER SUPPLY, SM-D-587066-2	F												Visual.
	20006-829A1-2 1A5A10		OS										5,6,14,L2	Voltage, regulation and ripple.
	REGULATORS, ±18 VOLT				F								5,6,39,L2	Voltage.
	20006-924B2-1								F					Defective plug-in cards.
	1A5A10A1									F			5,6,39,40,41, L2	Replace defective plug-in cards chassis piece parts.
	20006-924B2-2													
	1A5A10A2									D			4,6,39,40,41, L1	Replace defective piece parts.
1A1A3A8	ALARM MONITOR, SM-C-587035	F												Visual.
	20006-117A1-1 1A5A29		D										L1	Local power, ready-not-ready lamp main power.
									F				39	
													39,40,41,L1	Replace defective piece parts.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A3A9	DETECTOR RF, SM-C-587129 20006-134A1-1 1A5A38	F												Visual.
			D										1,7,10	Phase lock capability.
					D								1,7,10	Voltage and frequency.
									F				39,40	
										D			1,7,10,39, 40,41	Replace defective piece parts.
1A1A4	MONITOR AF, SM-D-587006 20006-100A3-1 1A6	O												Visual.
			O											BITE.
			F										1,4,5,6,L1	Audio monitor, amplifier gain, IM distortion, noise, impedance, output balance, emergency power.
				O										Clean.
					F								4,5,L1	Voltage.
									F				4,5,6,39,40, 41,L1	Replace defective piece parts and plug-in modules.
1A1A4A2	BATTERY, STORAGE, SM-A-584920 181-3-1 1A6A9	F												
			D										6,L2	Battery capacity, interlock, temperature sensing.
									F				39	
										D			6,39,40,41, L2	Determine disposition.
1A1A4A3	POWER SUPPLY, SM-D-587068 20006-712A1-1 1A6A10	F												
			OS										9,6,7,14,L2	Line and load regulation, ripple, current limiting.
					F								6,7,L2	Voltage.
									F				39,40,41	Defective plug-in cards.
										F			4,6,7,39 40,41,L2	Chassis piece parts.
1A1A4A3A1	REGULATOR, +18 VOLTS 20006-924B2-3 1A6A1-A1	F												
			D										6,14,L2	Voltage.
						D							6,14,L2	Voltage.
									F				39,40	Defective card.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A4A3A1 (cont)										D			6,14,39,40, 41,L2	Defective piece parts.
1A1A4A3A2	BATTERY CHARGER	F												
	20006-712B2-1 1A6A10A2		D										6,14,L2	Voltage.
						D							6,14,L2	Voltage.
									F				39,40	Defective card.
										D			6,14,39,40, 41,L2	Defective piece parts.
1A1A4A4	AMPLIFIER MONITOR, SM-D-587-53	F												
	200006-111A1-1 1A6A11		D										4,6,7	Distortion, frequency response, VU meter operation.
					D								4,6,7	Voltage and VU level.
									F				39,40	Defective subassembly.
										D			4,6,7,39,40, 41	Defective piece parts.
1A1A4A5	AMPLIFIER, LINE	F												
	20006-715A1 1A6A12 thru 1A6A19		F										4,6,7	Frequency response, gain, distortion.
									F				39,40	
										D				Determine disposition.
1A1A5	CONTROL CONVERTER, SM-D-593008-1	O												
	20006-200A1-1 1A7		F										6,7,30,L1	Voltage.
				O										Clean.
					F								6,7,L1	Voltage.
									F				39,40	Defective subassemblies.
										F			6,7,30,39,40, 41,L3,L8	Defective piece parts.
											D			Restore to servicable condition.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A5A1A1	POWER SUPPLY, SM-A-584904-1 219-435-1 1A7A27PS1	F												Visual.
			D										6,7,14,L2	Output voltage, line and load regulation, ripple short circuit protection.
					D								6,7,14,L2 39	Voltage.
									F					
										D				Determine disposition.
1A1A5A1A2A1	POWER SUPPLY, SM-A-584905-1 219-434-1 1A7A27-PS2	F												Visual.
			D										6,7,14,L2	Output voltage, line and load regulation, ripple.
					D								6,7,14,L2	Voltage.
										D				Determine disposition.
1A1A5A2	CIRCUIT CARD ASSEMBLY, SM-D-593059-1 20006-202A12-1 1A7A8	F												Visual.
			D										7,L3,L8	Signal/data commands.
									F				39	
										D			7,39,40,41, L3,L8	Replace defective piece parts.
1A1A5A3	CIRCUIT CARD ASSEMBLY, SM-D-593062-1 20006-202A13-1 1A7A2	F												Visual.
			D										7,L3,L8	Signal/data commands.
									F				39	
										D			7,39,40,41, L3,L8	Replace defective piece parts.
1A1A5A4	CIRCUIT CARD ASSEMBLY, SM-D-593065-1 20006-202A14-1	F												Visual.
			D										7,L3,L8	Signal/data commands.
									F				39	
										D			7,39,40,41, L3,L8	Replace defective piece parts.
1A1A5A5	CIRCUIT CARD ASSEMBLY, SM-D-593026-1 20006-202A1-1 1A7A7	F												Visual.
			D										7,L3,L8	Signal/data commands.
									F				39	

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A5A5 (cont)										D			7,39,40,41, L3,L8	Replace defective piece parts.
1A1A5A6	CIRCUIT CARD ASSEMBLY, SM-D-593074-1 20006-202A17-1 1A7A1	F	D						F	D			7,L3,L8 39 7,39,40,41, L3,L8	Visual. Signal/data commands. Replace defective piece parts.
1A1A5A7	CIRCUIT CARD ASSEMBLY, SM-D-593029-1 20006-202A2-1 1A7A12	F	D						F	D			7,L3,L8 39 7,39,40,41, L3,L8	Visual. Signal/data commands. Replace defective piece parts.
1A1A5A8	CIRCUIT CARD ASSEMBLY, SM-D-593077-2 20006-202A18-2 1A7A17	F	D						F	D			7,L3,L8 39 7,39,40,41, L3,L8	Visual. Signal/data commands. Replace defective piece parts.
1A1A5A9	CIRCUIT CARD ASSEMBLY, SM-D-593032-1 20006-202A3-1 1A7A25	F	D						F	D			7,L3,L8 39 7,39,40,41, L3,L8	Visual. Signal/data commands. Replace defective piece parts.
1A1A5A10	CIRCUIT CARD ASSEMBLY, SM-D-593098-1 20006-202A25-1 1A7A18	F	D						F	D			7,L3,L8 39 7,39,40,41, L3,L8	Visual. Signal/data commands. Replace defective piece parts.
1A1A5A11	CIRCUIT CARD ASSEMBLY, SM-D-593041-1 20006-202A6-1 1A7A26	F	D						F				7,L3,L8 39	Visual. Signal/data commands.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A5A11 (cont)										D			7,39,40,41, L3,L8	Replace defective piece parts.
1A1A5A12	CIRCUIT CARD ASSEMBLY, SM-D-593101-1 20006-202A26-1 1A7A6	F	D						F	D			7,L3,L8 39 7,L3,L8,39, 40,41	Visual. Signal/data commands. Replace defective piece parts.
1A1A5A13	CIRCUIT CARD ASSEMBLY, SM-D-593044-1 20006-202A7-1 1A7A13	F	D						F	D			7,L3,L8 39 7,39,40,41, L3,L8	Visual. Signal/data commands. Replace defective piece parts.
1A1A5A14	CIRCUIT CARD ASSEMBLY, SM-D-593104-1 20006-202A27-1 1A7A15	F	D						F	D			7,L3,L8 39 7,L3,L8,39, 40,41	Visual. Signal/data commands. Replace defective piece parts.
1A1A5A15	CIRCUIT CARD ASSEMBLY, SM-D-593133-1 20006-202A32-1 1A7A5 1A7A10 1A7A11 1A7A19 1A7A20 1A7A22 1A7A23	F	D						F	D			7,L3,L8 39 7,L3,L8,39, 40,41	Visual. Signal/data commands. Replace defective piece parts
1A1A5A16	CIRCUIT CARD ASSEMBLY, SM-D-593107-1 20006-202A28-1 1A7A16	F	D						F	D			7,L3,L8 39 7,39,40,41, L3,L8	Visual. Signal/data commands. Replace defective piece parts.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A5A17	CIRCUIT CARD ASSEMBLY, SM-D-593050-1 20006-202A9-1 1A7A9	F												Visual.
			D										7,L3,L8 39	Signal/data commands.
									F					
										D			7,39,40,41, L3,L8	Replace defective piece parts.
1A1A5A18	CIRCUIT CARD ASSEMBLY, SM-D-593116-1 20006-202A31-1 1A7A24	F												Visual.
			D										7,L3,L8 39	Signal/data commands.
									F					
										D			7,39,40,41, L3,L8	Replace defective piece parts.
1A1A5A19	CIRCUIT CARD ASSEMBLY, SM-D-593053-1 20006-202A10-1 1A7A21	F												Visual.
			D										7,L3,L8 39	Signal/data commands.
									F					
										D			7,39,40,41, L3,L8	Replace defective piece parts.
1A1A5A20	CIRCUIT CARD ASSEMBLY, SM-D-593026-2 20006-202A1-2 1A7A3	F												Visual.
			D										7,L3,L8 39	Signal/data commands.
									F					
										D			7,39,40,41, L3,L8	Replace defective piece parts.
1A1A6	SYNTH ELEC FREQUENCY, SM-D-587002 20006-900A1-1 1A2	O												Visual.
			O F OS											BITE.
													1,2,3,8, 17,19,24	Frequency and RF voltage, frequency stability.
				O										Clean.
					F								1,2,3,8,	Frequency and RF voltage adjustments.
										F			1,2,3,8, 39 40,41	Replace defective piece parts and subassemblies.
											D			

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GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A6A1A1	DISTRIBUTION BOX, SM-D-587100 20006-900B45-1 1A2A22A1	O												Visual.
			F										1,3,L1	Voltage and continuity.
										F			1,3,39,41,L1	Replace defective piece parts.
1A1A6A1A2	GENERATOR, RF SIGNAL (1.75 MDz), SM-D-587079 20006-911A1-1 1A2A22A20	F												Visual.
			D										1,3,L13	Frequency and RF voltage.
					D								1,3,L13	Voltage and frequency adjustment.
									F				39,40	
										D			1,3,39,41,L13	Replace defective piece parts.
1A1A6A1A3	AFC SELECTOR, SM-D-587085 20006-919A1-1 1A2A22A16	O												Visual.
			F										3	Voltage and continuity.
									F				39	
										D			3,39,40,41, L13	Replace defective piece parts.
1A1A6A1A4	POWER SUPPLY, SM-D-587087 20006-924A1-1 1A2A22A21	O												Visual.
			F										5,L2	Voltage, resistance, ripple, load regulation, line regulation.
			OS										5,14,L2	Current limiting, over voltage protection.
	"				F								5,L2	Voltage.
									F				5,6,39,40, 41,L2	Replace defective piece parts and plug-in cards.
1A1A6A1A4A1	CIRCUIT CARD ASSEMBLY 20006-924B5-1 1A2A22A21A2 20006-924B-2 1A2A22A21A1	F												Visual.
			D										14,L13	Operational, voltage.
									F				39	
										D			14,39,40,41 L13	Replace defective piece parts.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A6A1A5	AMPLIFIER, RF, SM-D-587081 20006-914A1-1 1A2A22A19	F												Visual.
			D										L13 39	Voltage and relay function.
									F					
										D			39,40,41,L13	Replace defective piece parts.
1A1A6A1A6	FILTER, LOW PASS (2.5 MHz) 20006-900B11-1 1A2A22FL3	F												Visual.
			D										1,2,3,8,L13	Insertion loss, ripple, rejection frequencies.
									F				39	
										D			1,2,3,8,39,40,41,L13	Replace defective piece parts.
1A1A6A1A7	CIRCUIT CARD ASSEMBLY 20006-900B13-1 1A2A22TB2	F												Visual.
			D										L13 39	Operational.
									F					
										D			39,40,41,L13	Replace defective piece parts.
1A1A6A1A8	SYNTH SUBASSEMBLY 20006-900B2-1 1A2A22A2	O												Visual.
			F										6	Voltage and resistance.
										F			6,39,40,41	Replace defective piece parts.
1A1A6A1A10	FILTER BANDPASS 20006-900B16-1 1A2A22FL4	F												Visual.
			D										1,3,8,32,33,L13	Insertion loss, ripple, rejection frequencies.
									F				39	
										D			1,3,8,32,33,39,40,41,L13	Replace defective piece parts.

SECTION II. **MAINTENANCE ALLOCATION CHART**

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A6A1A11	FILTER AND CONNECTOR (20006-90B37-1) 1A2A22FL2	F	F							F			1,3,8,L1 1,3,8,39,40,41,L1	Visual. Rejection frequencies. Replace defective piece parts.
1A1A6A2	OSCILLATOR, RF 20006-903A1-1 1A2A7 SMD-587071	F	F			OS			F	F			1,3,8 1,3,20,39 39 1,3,20,39	Visual. Replace modules. Defective piece parts.
1A1A6A2A1	OSCILLATOR, RF SUBASSEMBLIES A7A1 thru A7A11 (20006-903B3 & 903B4 A7A12 (20006-903B14) A7A13 thru A7A23 (20006-903B45) A7A24 (20006-903B11) A7A25 (20006-903B13)	D	D			D				D			1,3,L13 1,3,L13 1,3,39,41,L13	Visual.

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GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A6A3	MIXER STAGE FREQUENCY, SM-D-587073 20006-905A1 1A2A3	F												Visual.
			D										1,3,L13	Voltage and spurious response.
					D								1,3,L13	Frequency and voltage adjustment.
									F				39	
										D			1,3,39,40,41 L13	Replace defective piece parts.
1A1A6A3A1	100 KHz INTERPOLATOR OUTPUT AMPLIFIER	F	D			D			D	D			2,3,6,L13	
1A1A6A4	MULTIPLIER FREQUENCY, SM-D-587076 20006-908A1-1 1A2A18	F												Visual.
			D										1,3,7,8,32 33,L13	Frequency, RF voltage, spurious emission.
						D							1,3,7,8,32, 33,L13	Frequency, filter
									F				39	
										D			1,3,7,8,32, 33,39,40,41, L13	Replace defective piece parts.
1A1A6A5	SWITCH BOX, DIODE, SM-D-587078 20006-910A1-1 1A4A15	F												Visual.
			F										2,3,L7	Frequency and output voltage level.
									F				39	
										F			2,3,39,41,L7	Replace defective piece parts.

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GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A6A5A1	CIRCUIT CARD ASSEMBLY	D												Visual.
	1A4A15A1 thru 1A4A15A5		D										2,3,L13	
	1A4A15A6 thru 1A4A15A15									D			2,3,39,41,L13	Replace defective piece parts.
	1A4A15A16 thru 1A4A15A25													
	1A4A15A26 thru 1A4A15A28													
1A1A6A6	CIRCUIT CARD ASSEMBLY (BAND INFORMATION ASSEMBLY),	F												Visual.
	SM-D-587080		D										L13	Circuit function.
	20006-913A1-1 1A2A13								F				39	
										D			39,40,41,L13	Replace defective piece parts.
1A1A6A7	GENERATOR SIGNAL, SM-D-587082	F												Visual.
	20006-915A1-1 1A2A14		D										1,3,8,10,20, L13	Frequency and RF voltage.
						D							1,3,8,10,20 L13	Frequency and voltage adjustment.
									F				39	

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GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
										D			1,3,8,10,20, 39,40,41,L13	Replace defective piece parts.
1A1A6A8	CIRCUIT CARD ASSEMBLY (CONTROL REMOTE SWITCH), SM-D-587083	F												Visual.
	20006-916A1-1 (1A2A12)		D										L13	Circuit function.
	SM-D-587093								F				39	
	20006-916A1-2									D			39,40,41,L13	Replace defective piece parts.
	1A2A9 thru 1A2A11													
1A1A6A9	AMPLIFIER, RF, SM-D-587092	F												Visual.
	20006-925A1-1 1A2A17		D										3,L13	RF voltage.
									F				39	
										D			3,39,40,41, L13	Replace defective piece parts.
1A1A6A10	MIXER STAGE FREQUENCY DIVIDER ASSEMBLY, SM-D-587072	F				D							3,L13	Voltage adjustment.
	20006-904A1-1 1A2A4		D											Visual.
	1A2A5												1,2,3,7,10, L13	RF voltage and spurious response.
	1A2A6				D								1,2,3,7,10, L13	Frequency and voltage adjustment.
									F				39	
										D			1,2,3,7,10, 39,40,41,L13	Replace defective piece parts.
1A1A6A11	MIXER STAGE FREQUENCY, SM-D-587074	F												Visual.
	20006-906A1-1 1A2A1		D										1,3,7,12,16, 20,25,32,L13	RF voltage and spurious response.
									F				39	
										D			1,3,7,12,16, 20,25,32,39, 40,41,L13	Replace defective piece parts.
					D								1,3,7,12,16, 20,25,32,L13	Cards

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GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A1A6A12	CONVERTER FREQUENCY ELEC, 20006-909A1-1 1A2A2	F												Visual.
			D										1,3,7,8,28, 32,L13	Gain and spurious response.
					D								1,3,7,8,28, 32,L13	147 MHz.
									F				39,40	
										D			1,3,7,8,28, 32,39,40,41, L13	Replace defective piece parts.
1A1A6A13	CIRCUIT CARD ASSEMBLY (FAULT INDICATOR ASSEMBLY), SM-D-587084 20006-917A1-1 1A2A8	F												Visual.
			D										L13	Circuit function.
									F				39	
										D			39,40,41,L13	Replace defective piece parts.
1A2	CONTROL RECEIVER, SM-D-593016-1 20006-200A4-1 (2)	O												Visual.
			F										7,6,L3,L9	Data loop and operational commands.
				O										Clean.
					F								7,6,L3,L9	Voltage.
									F				7,6,40,39 41,L3,L9	Replace defective piece parts and defective assemblies.
											D			Restore to serviceable condition.
1A2A1A1	POWER SUPPLY, 219-435-1, 219-434-1 2A25-PS1 2A25-PS2	F												Visual.
			D										7,14	Output voltage, line and load regulation, ripple, short circuit protection.
					D								7,14	Voltage.
									F				39	
										D				Determine disposition.

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GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A2A2	CIRCUIT CARD ASSEMBLY 20006-202A13-1 2A10	F	D						F	D			7,L14 39 7,39,40,41, 14,L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A3	CIRCUIT CARD ASSEMBLY, SM-D-593071-1 20006-202A16-1 2A4	F	D						F	D			7,L14 39 7,14,39,40, 41,L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A4	CIRCUIT CARD ASSEMBLY 20006-202A1-1 2A9	F	D						F	D			7, L14 39 7,14,39,40, 41,L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A5	CIRCUIT CARD ASSEMBLY, SM-D-593077-1 20006-202A18-1 2A21	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A6	CIRCUIT CARD ASSEMBLY, SM-D-593080-1 20006-202A19-1 2A7	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A7	CIRCUIT CARD ASSEMBLY 20006-202A2-1 2A11	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.

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GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A2A8	CIRCUIT CARD ASSEMBLY, SM-D-593083-1 20006-202A20-1 2A6	F	D						F	D			7,L14 39 7,41,39,40, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A9	CIRCUIT CARD ASSEMBLY 20006-202A3-1 2A23	F	F						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A10	CIRCUIT CARD ASSEMBLY, SM-D-593086-1 20006-202A21-1 2A8	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A11	CIRCUIT CARD ASSEMBLY, SM-D-593035-1 20006-202A4-1 2A2	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A12	CIRCUIT CARD ASSEMBLY 20006-202A28-1 2A20	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A13	CIRCUIT CARD ASSEMBLY, SM-D-593038-1 20006-202A5-1 2A3	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.

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GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A2A14	CIRCUIT CARD ASSEMBLY, SM-D-593110-1 20006-202A29-1 2A15 2A16	F	D						F	D			7,L14 39,40 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A15	CIRCUIT CARD ASSEMBLY 20006-202A6-1 2A24	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A16	CIRCUIT CARD ASSEMBLY 20006-202A1-2 2A5	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A17	CIRCUIT CARD ASSEMBLY 20006-202A7-1 2A12	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A18	CIRCUIT CARD ASSEMBLY, SM-D-593104-2 20006-202A27-2 2A19	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A19	CIRCUIT CARD ASSEMBLY, SM-D-593113-1 20006-202A30-1 2A22	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.

SECTION II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	FUNCTIONAL GROUP	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/FRR-79 (continued)													
1A2A20	CIRCUIT CARD ASSEMBLY, SM-D-593092-1 20006-202A23-1 2A17 2A18	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.
1A2A21	CIRCUIT CARD ASSEMBLY 20006-202A27-3 2A14	F	D						F	D			7,L14 39 7,39,40,41, L14	Visual. Signal/data commands. Replace defective piece parts.

TABLE I. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE		FEDERAL STOCK NUMBER	TOOL NUMBER
		CONTRACTOR RECOMMENDED	MILITARY EQUIVALENT		
1	F,D	Counter, Electronic Frequency Systron Donner 6152 with options 01,11 and 15	Counter, Electronic Frequency AN/USM-207	6625-911-6368	
2	F,D	Signal Generator Logimetrics 921S111	Generator, Signal AN/GRM-50	6625-868-8353	
3	F,OS,D	RF VTVM Boonton 92A	Voltmeter, Electronic AN/URM-145	6625-973-3986	
4	F,D	DC VTVM HP 4ØØD	Voltmeter, Electronic ME-30(E)/U	6625-669-0742	
5	F,D	Wave Analyzer HP 3Ø2A	Analyzer, Spectrum TS-1830/U	6625-806-5929	
6	F,D	Multimeter Simpson 26Ø Series 6 with DC Safety Probe 00506	Multitester AN/USM-210	6625-019-0815	
7	F,D	Oscilloscope Teltronix 564 W/Plug-ins 3A4 and 3B6			
8	F,OS,D	Variable Attenuator Kay 432D	Attenuator, Variable CN-796( )/U	5985-831-5991	
9	(Deleted)				
10	F,D	DC VTVM HP 41ØB	Multitester ME-26B/U	6625-542-6407	
11	(Deleted)				
12	F,D	Random Noise Generator GR 139ØB			
13	(Deleted)		Test Set, Radio AN/URM-134A	6625-987-9805	

TABLE I. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE CONTRACTOR RECOMMENDED	NOMENCLATURE MILITARY EQUIVALENT	FEDERAL STOCK NUMBER	TOOL NUMBER
14	OS,D	Variac GR W5MT	Transformer CN-16A/U	5990-235-2086	
15	OS,D	Synthesizer HP 5100B/5110B	Frequency Synthesizer Set AN/USM-194		
16	OS,D	Signal Generator HP 608E	Generator, Signal AN/USM-44A	6625-539-9685	
17	OS,D	Frequency Standard HP 5065A			
18	OS,D	Hybrid Network Anzac HCK-7750			
19	OS,D	Frequency Comparator Tracor 527A(MOD)	Meter, Frequency Dev. AN/URM-115A		
20	OS,D	Selective Voltmeter Rhode & Schwarz 1521USVH			
21	OS,D	Measuring Set, Delay & Atten Wandel & Goltermann LDS-2			
22	OS,D	Measuring Set, Delay & Atten Wandel & Goltermann LDE-2			
23	OS,D	Pen Recorder HP 136A			
24	OS,D	Digital Recorder Systron Donner 5103 with options C101 and C102			
25	OS,D	Crystal Mixer HP10514A	Mixer, Coaxial CV-2343		
26	OS,D	Directional Coupler Anzac CNJ-7940	Coupler, Directional CU-1404/U		
27	(Deleted)				

TABLE I. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE		FEDERAL STOCK NUMBER	TOOL NUMBER
		CONTRACTOR RECOMMENDED	MILITARY EQUIVALENT		
L1	F,D	Receiver Test Set Litcom 4700			
L2	F,D	Low Level Power Supply Test Set Litcom 4740			
L3	F,D	Digital Test Set Litcom 4200			
L4	(Deleted)				
L5	(Deleted)				
L6	(Deleted)				
L7	F,D	Synthesizer Test Set Litcom 4603C			
L8	F,D	Receiver RCU Test Set Litcom 4699A			
L9	F,D	Receiver CCU Test Set Litcom 4698A			
L10	(Deleted)				
L11	(Deleted)				
L12	D	Receiver Depot Test Set Litcom 7700B			
L13	D	Synthesizer Depot Test Set Litcom 7900			
L14	D	Digital Depot Test Set Litcom 7200			

TABLE I. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE		FEDERAL STOCK NUMBER	TOOL NUMBER
		CONTRACTOR RECOMMENDED	MILITARY EQUIVALENT		
28	OS,D	Noise & Field Intensity Meter Singermeterics NF 1Ø5A with BA-105A, T-A/NF 105A, T-1/NF 105A	Radio Interference Measuring Set AN/URM-85	6625-776-0595	
29	OS,D	RMS Voltmeter Ballantine 320A	Voltmeter, Electronic AN/URM-145	6625-973-3986	
30	OS,D	Power Stat (Variac) Superior 1156 DU-6Y			
31	OS,D	RX Meter HP 250B			
32	D	Sweep Generator Telonic SM 2000 with plug-in unit SH-1M	Generator, Sweep AN/URM-203	6625-086-716	
33	D	Logarithmic Amplifier Kay 1Ø25B			
34	D	Crystal Detector Telonic XD-8A			
35	(Deleted)				
36	D	Mega-Switch Kay Model KMC-255B			
37	D	Power Amplifier HP 230A			
38	D	Oscillator Wavetek Model 130			
39	F,D	Tool Kit, Electronic Equipment TK-100/G	Tool Kit, Electronic Equipment TK-100/G	5180-605-0079	
40	F,D	Tool Kit, Electronic Equipment TK-105/G	Tool Kit, Electronic Equipment TK-105/G	5180-610-8177	
41	F,D	Repair Kit	Repair Kit, PC Board MK-772/U	5999-757-7042	

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By Order of the Secretary of the Army:

WILLIAM C. WESTMORELAND,
General, United States Army,
Chief of Staff.

OFFICIAL:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

CNGB (1)
Dir of Trans (1)
CofEngrs (1)
TSG (1)
CofSptS (1)
ACSC-E (2)
USAMB (10)
USAARENBD (2)
USCONARC (2)
USAMC (2)
USAMICOM (2)
USAECOM (2)
ARADCOM (2)
ARADCOM Rgn (1)
OS Maj Comd (2)
USACDCEC (10)
USASTRATCOM (5)
USASTRATCOM EUR (5)
USASTRATCOM PAC (5)
USASTRATCOM SO (5)
USASTRATCOM V (10)
USAESC (70)
USATECOM (1)
Armies (1)
Sig FLDMS (1)
USASESS (10)
USASA (2)
USACDCCEA (1)
USACDCCEA Ft Huachuca (1)
Army Depots (1) except
LBAD (14)
SAAD (30)
TOAD (14)
LEAD (7)
NAAD (3)
SVAD (3)
ATAD (10)
Svc Colleges (1)
Gen Dep (1)
Sig Sec Gen Dep (4)
Sig Dep (6)
USACRREL (2)
Fort Huachuca (5)
Fort Carson (7)
WSMR (2)
USAERDAA (2)
USAERDAW (2)
Units org under fol TOE (1 copy each):
11-155
11-157
11-158
11-587
11-592
11-597
29-134

NG: State AG (3).

USAR: None.

For explanation of abbreviations used, see AR 320-50.

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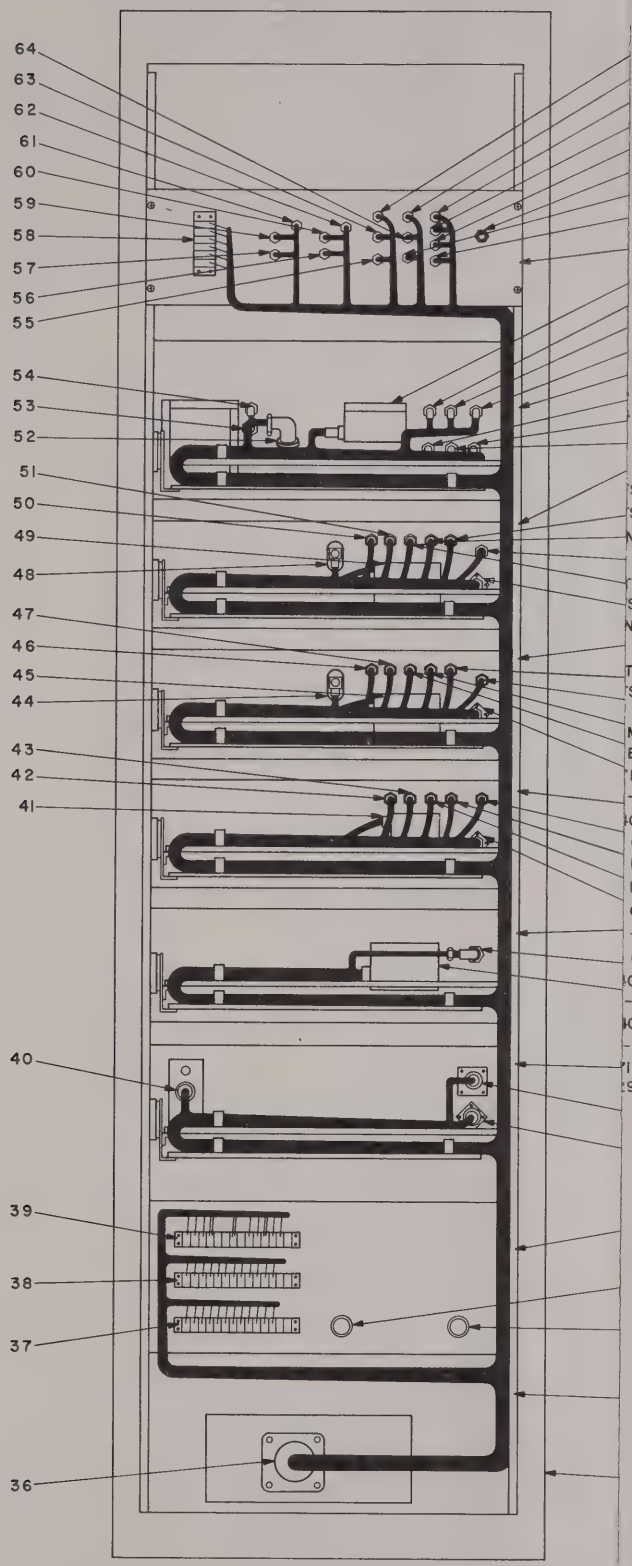
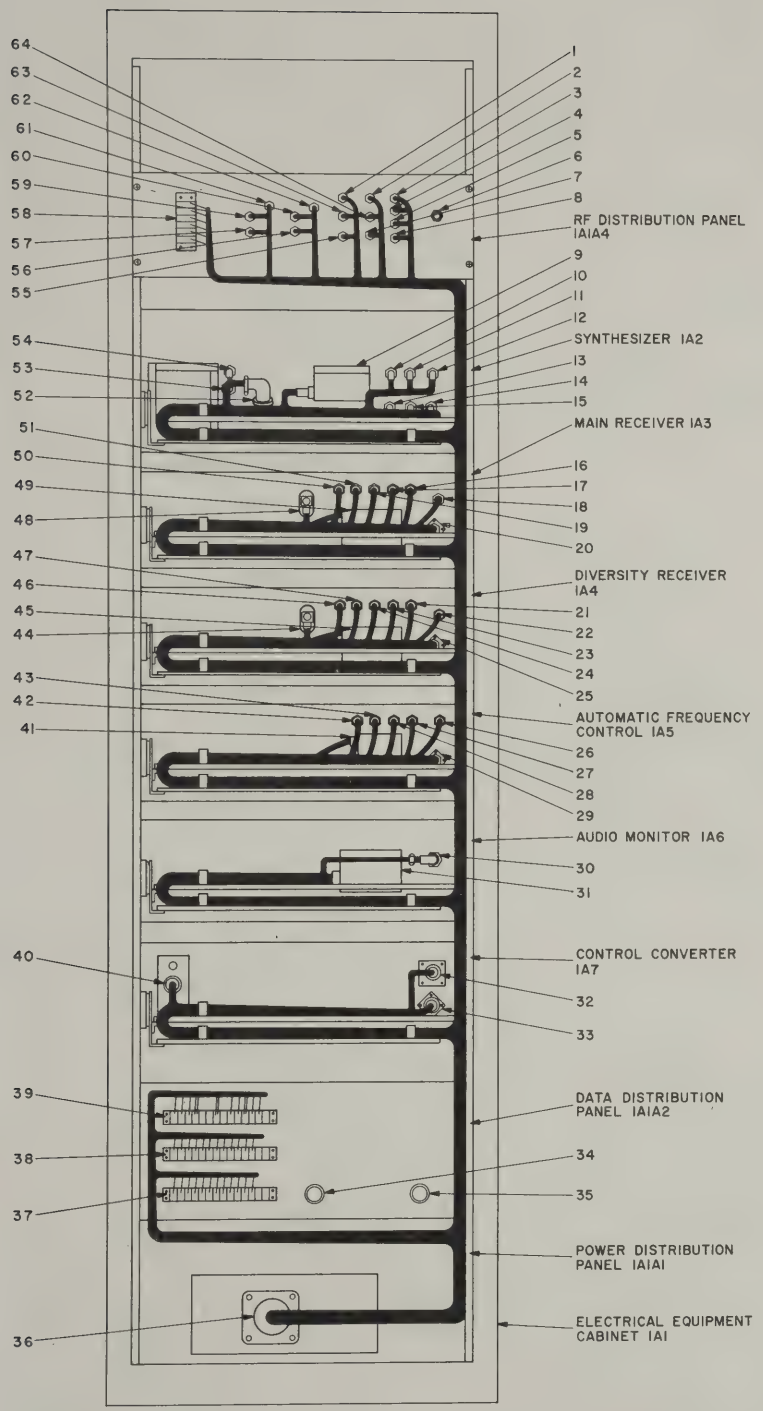


	JACK	PLUG
	A1 L1	
	A1 L2	
	GRD	
	B1 L1	
	B1 L2	
	B1 GRD	
DIVERSITY RCVR AUDIO LINES	A2 L1	
	A2 L2	
	A2 GRD	
	B2 L1	
	B2 L2	
	B2 GRD	
		W1P6
		W1P4
	S 1.75 MHz	W8P2
	S 1 MHz	W22P2
	NNA	W26P1
		W1P3
	PUT	W25P1
	S MHz 130/140/150	W20P2
	NNA	W23P1
		W1P2
	TPUT	W24P1
	S MHz 130/140/150	W19P2
		W2P2
	MONITOR	W22P1
	EXT INPUT	W4P1
	1 MHz	W14P1
	-161.75 MHz	W16P1
	0/150 MHz	W19P1
	GRD	W1P1-CM
	150 MHz COMMAND IN	W1P1-BV
	140 MHz COMMAND IN	W1P1-BW
	GRD MONITOR	W1P5-BT
	+18V MONITOR	W1P5-CB
	BAND 2 COMMAND IN	W1P1-BA
	0/150 MHz IN	W18P1
	-161.75 MHz IN	W15P1
	0/150 MHz	W20P1
	-161.75 MHz	W17P1
	1 MHz	W13P1
	9 MHz	W10P1



LEGEND

	JACK		PLUG
1.	A1J1	1.74371 MHz IN	W12P1
2.	A2J1	1.75629 MHz IN	W9P1
3.	A3J1	1.75 MHz IN	W5P1
4.	A3J2	1.75 MHz	W8P1
5.	A3J3	1.75 MHz	W7P1
6.	J1	EXTERNAL STANDARD 1MHz 0.5-1.5 V RMS	W4
7.	A2J3	1.75629 MHz	W11P1
8.	A3J4	1.75 MHz	W6P1
9.	FL2J1		W1P1
10.	J12	151.75-161.75 MHz	W15P2
11.	J13	1.75 MHz OUTPUT	W5P2
12.	J14	22 MHz INPUT	W21P1
13.	J15	1.756290 MHz OUTPUT	W9P2
14.	J11	130/140/150 MHz OUTPUT	W18P2
15.	J14	1.743710 MHz OUTPUT	W12P2
16.	J22	INPUTS MHz 1.75629	W10P2
17.	J21	INPUTS MHz 1.74371	W13P2
18.	J20	1.75 MHz	W6P2
19.	J17	INPUTS MHz 151.75-161.75	W16P2
20.	J2	AC POWER	W2P4
21.	J22	INPUTS MHz 1.75629	W11P2
22.	J20	1.75 MHz	W7P2
23.	J21	INPUTS MHz 1.74371	W14P2
24.	J17	INPUTS MHz 151.75-161.75	W17P2
25.	J2	AC POWER	W2P5
26.	J2	INPUTS DIV	W24P2
27.	J1	INPUTS MAIN	W25P2
28.	J7	OUTPUT 22 MHz	W21P2
29.	J3	AC POWER	W2P6
30.	FL1		W2P7
31.	J1		W1P5
32.	J2	TTY	W3P1
33.	J1	AC LINE	W2P3
34.	A1J2	ANTENNA MAIN RCVR	W23P2
35.	A2J2	ANTENNA DIVERSITY RCVR	W26P2
36.	J1	POWR DISTR	W2P1
37.	1A1A2TB1-1	RCVR MON GRD	
	-2	RCVR MON +18V	
	-3	MAIN RCVR ANT RELAY	
	-4	MAIN RCVR GRD	
	-5		
	-6	DIVERSITY RCVR ANT RELAY	
	-7	DIVERSITY RCVR GRD	
	-8		
	-9	CCU DATA IN +	
	-10	CCU DATA IN -	
	-11	GRD	
	-12	CCU DATA OUT +	
	-13	CCU DATA OUT -	
	-14		
38.	1A1A2TB2-1	A1L1	
	-2	A1L2	
	-3	GRD	
	-4	B1L1	
	-5	B1L2	
	-6	B1GRD	
	-7	A2L1	MAIN RCVR AUDIO LINES
	-8	A2L2	
	-9	A2GRD	
	-10	B2L1	
	-11	B2L2	
	-12	B2GRD	
	-13		
	-14		

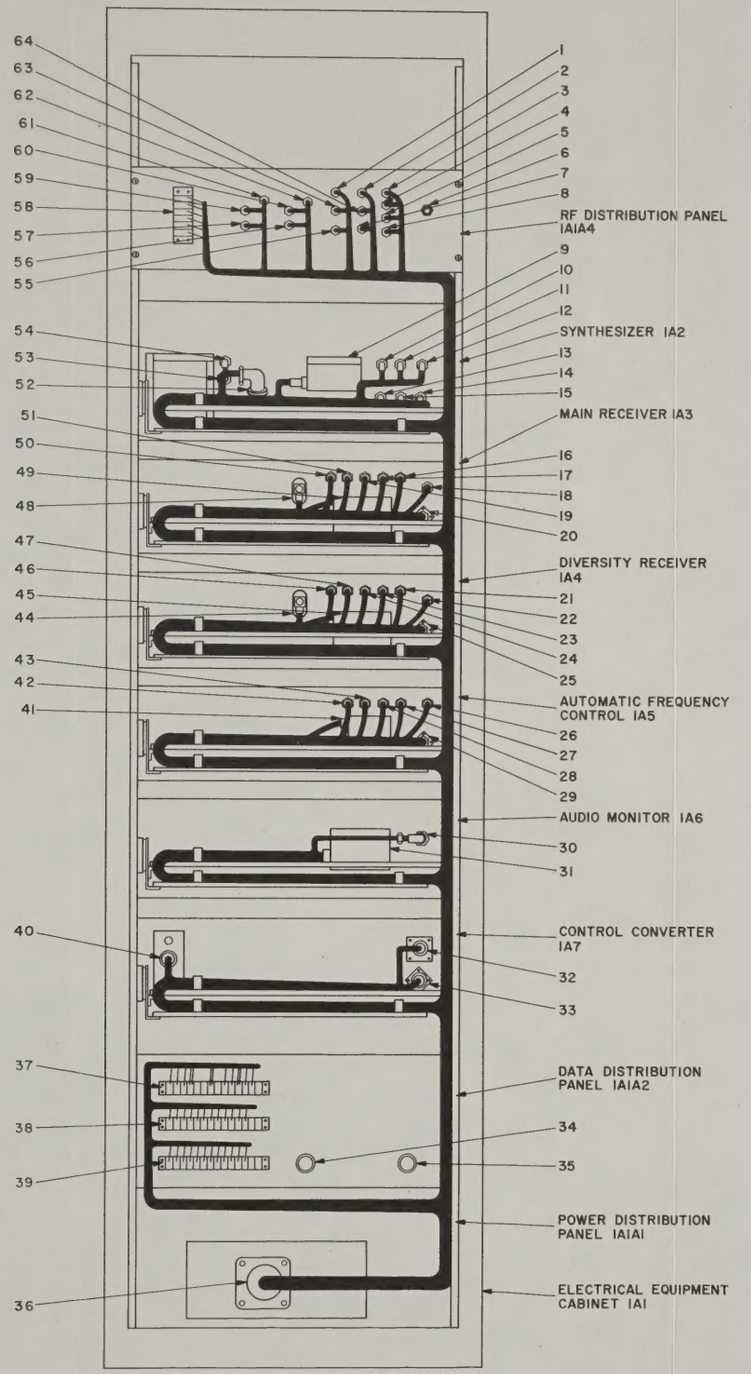
	JACK		PLUG
39.	1A1A2TB3-1	A1L1	
	-2	A1L2	
	-3	GRD	
	-4	B1L1	
	-5	B1L2	
	-6	B1GRD	
	-7	A2L1	DIVERSITY RCVR AUDIO LINES
	-8	A2L2	
	-9	A2GRD	
	-10	B2L1	
	-11	B2L2	
	-12	B2GRD	
	-13		
	-14		
40.	J3		W1P6
41.	J4		W1P4
42.	J5	INPUTS 1.75 MHz	W8P2
43.	J6	INPUTS 1 MHz	W22P2
44.	J1	ANTENNA	W26P1
45.	J7		W1P3
46.	J19	IF OUTPUT	W25P1
47.	J18	INPUTS MHz 130/140/150	W20P2
48.	J1	ANTENNA	W23P1
49.	J7		W1P2
50.	J19	IF OUTPUT	W24P1
51.	J18	INPUTS MHz 130/140/150	W19P2
52.	FL1J1		W2P2
53.	J9	1MHz MONITOR	W22P1
54.	J7	1MHz EXT INPUT	W4P1
55.	A1J3	1.74371 MHz	W14P1
56.	A4J2	151.75-161.75 MHz	W16P1
57.	A5J2	130/140/150 MHz	W19P1
58.	1A1A4TB1-1	GRD	W1P1-CM
	-2	150 MHz COMMAND IN	W1P1-BV
	-3	140 MHz COMMAND IN	W1P1-BW
	-4	GRD MONITOR	W1P5-BT
	-5	+18V MONITOR	W1P5-CB
	-6	BAND 2 COMMAND IN	W1P1-BA
59.	A5J1	130/140/150 MHz IN	W18P1
60.	A4J1	151.75-161.75 MHz IN	W15P1
61.	A5J3	130/140/150 MHz	W20P1
62.	A4J3	151.75-161.75 MHz	W17P1
63.	A1J2	1.74371 MHz	W13P1
64.	A2J2	1.75629 MHz	W10P1

TM 5820-601-12-35

Figure 6-1. Receiver group cording diagram.

END

	JACK	PLUG
39.	IAIA2TB3-1 AILI	
	-2 AIL2	
	-3 GRD	
	-4 BILI	
	-5 BIL2	
	-6 BI GRD	
	-7 A2 LI	DIVERSITY RCVR AUDIO LINES
	-8 A2 L2	
	-9 A2 GRD	
	-10 B2 LI	
	-11 B2 L2	
	-12 B2 GRD	
	-13	
	-14	
40.	J3	WIP6
41.	J4	WIP4
42.	J5 INPUTS 1.75 MHz	W8P2
43.	J6 INPUTS 1 MHz	W22P2
44.	JI ANTENNA	W26PI
45.	J7	WIP3
46.	JI9 IF OUTPUT	W25PI
47.	JI8 INPUTS MHz 130/140/150	W20P2
48.	JI ANTENNA	W23PI
49.	J7	WIP2
50.	JI9 IF OUTPUT	W24PI
51.	JI8 INPUTS MHz 130/140/150	WI9P2
52.	FLIJI	W2P2
53.	J9 IMHz MONITOR	W22PI
54.	J7 IMHz EXT INPUT	W4PI
55.	AIJ3 1.74371 MHz	WI4PI
56.	A4J2 151.75-161.75 MHz	WI6PI
57.	A5J2 130/140/150 MHz	WI9PI
58.	IAIA4TBI-1 GRD	WIPI-CM
	-2 150 MHz COMMAND IN	WIPI-BV
	-3 140 MHz COMMAND IN	WIPI-BW
	-4 GRD MONITOR	WIP5-BT
	-5 +18V MONITOR	WIP5-CB
	-6 BAND 2 COMMAND IN	WIPI-BA
59.	A5JI 130/140/150 MHz IN	WI8PI
60.	A4JI 151.75-161.75 MHz IN	WI5PI
61.	A5J3 130/140/150 MHz	W20PI
62.	A4J3 151.75-161.75 MHz	WI7PI
63.	AIJ2 1.74371 MHz	WI3PI
64.	A2J2 1.75629 MHz	WIOPI



LEGEND

	JACK	PLUG
1.	A1J1 1.74371 MHz IN	W12P1
2.	A2J1 1.75629 MHz IN	W9P1
3.	A3J1 1.75 MHz IN	W5P1
4.	A3J2 1.75 MHz	W8P1
5.	A3J3 1.75 MHz	W7P1
6.	J1 EXTERNAL STANDARD 1MHz 0.5-1.5 V RMS	W4
7.	A2J3 1.75629 MHz	W11P1
8.	A3J4 1.75 MHz	W6P1
9.	FL2J1	W1P1
10.	J12 151.75-161.75 MHz	W15P2
11.	J13 1.75 MHz OUTPUT	W5P2
12.	J10 22 MHz INPUT	W21P1
13.	J15 1.756290 MHz OUTPUT	W9P2
14.	J11 130/140/150 MHz OUTPUT	W18P2
15.	J14 1.743710 MHz OUTPUT	W12P2
16.	J22 INPUTS MHz 1.75629	W10P2
17.	J21 INPUTS MHz 1.74371	W13P2
18.	J20 1.75 MHz	W6P2
19.	J17 INPUTS MHz 151.75-161.75	W16P2
20.	J2 AC POWER	W2P4
21.	J22 INPUTS MHz 1.75629	W11P2
22.	J20 1.75 MHz	W7P2
23.	J21 INPUTS MHz 1.74371	W14P2
24.	J17 INPUTS MHz 151.75-161.75	W17P2
25.	J2 AC POWER	W2P5
26.	J2 INPUTS DIV	W25P2
27.	J1 INPUTS MAIN	W24P2
28.	J7 OUTPUT 22 MHz	W21P2
29.	J3 AC POWER	W2P6
30.	FL1 J2	W2P7
31.	J1	W1P5
32.	J1 AC LINE	W2P3
33.	J2 TTY	W3P7
34.	A1J1 ANTENNA MAIN RCVR	W23P2
35.	A2J1 ANTENNA DIVERSITY RCVR	W26P2
36.	J1 POWR DISTR	W2P1
37.	1A1A2TB1-1 RCVR MON GRD	
	-2 RCVR MON +18V	
	-3 MAIN RCVR ANT RELAY	
	-4 MAIN RCVR GRD	
	-5	
	-6 DIVERSITY RCVR ANT RELAY	
	-7 DIVERSITY RCVR GRD	
	-8	
	-9 CCU DATA IN +	
	-10 CCU DATA IN -	
	-11 GRD	
	-12 CCU DATA OUT +	
	-13 CCU DATA OUT -	
	-14	
38.	1A1A2TB2-1 A1L1	
	-2 A1L2	
	-3 A1 GRD	
	-4 B1 L1	
	-5 B1 L2	
	-6 B1 GRD	
	-7 A2 L1	MAIN RCVR AUDIO LINES
	-8 A2 L2	
	-9 A2 GRD	
	-10 B2 L1	
	-11 B2 L2	
	-12 B2 GRD	
	-13	
	-14	

	JACK	PLUG
39.	1A1A2TB3-1 A1L1	
	-2 A1L2	
	-3 GRD	
	-4 B1 L1	
	-5 B1 L2	
	-6 B1 GRD	
	-7 A2 L1	DIVERSITY RCVR AUDIO LINES
	-8 A2 L2	
	-9 A2 GRD	
	-10 B2 L1	
	-11 B2 L2	
	-12 B2 GRD	
	-13	
	-14	
40.	J3	W1P6
41.	J4	W1P4
42.	J5 INPUTS 1.75 MHz	W8P2
43.	J6 INPUTS 1 MHz	W22P2
44.	J1 ANTENNA	W26P1
45.	J7	W1P3
46.	J19 IF OUTPUT	W25P1
47.	J18 INPUTS MHz 130/140/150	W20P2
48.	J1 ANTENNA	W23P1
49.	J7	W1P2
50.	J19 IF OUTPUT	W24P1
51.	J18 INPUTS MHz 130/140/150	W19P2
52.	FL1J1	W2P2
53.	J9 1MHz MONITOR	W22P1
54.	J7 1MHz EXT INPUT	W4P1
55.	A1J3 1.74371 MHz	W14P1
56.	A4J2 151.75-161.75 MHz	W16P1
57.	A5J2 130/140/150 MHz	W19P1
58.	1A1A4TB1-1 GRD	W1P1-CM
	-2 150 MHz COMMAND IN	W1P1-BV
	-3 140 MHz COMMAND IN	W1P1-BW
	-4 GRD MONITOR	W1P5-BT
	-5 +18V MONITOR	W1P5-CB
	-6 BAND 2 COMMAND IN	W1P1-BA
59.	A5J1 130/140/150 MHz IN	W18P1
60.	A4J1 151.75-161.75 MHz IN	W15P1
61.	A5J3 130/140/150 MHz	W20P1
62.	A4J3 151.75-161.75 MHz	W17P1
63.	A1J2 1.74371 MHz	W13P1
64.	A2J2 1.75629 MHz	W10P1

EL5820-601-12-CI-TM-35

Figure 6-1. Receiver group cording diagram.